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CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

OFFICIAL NOTICES—

American Gas Institute.—In the Matter of a Proposed Bulletin of Abstracts.....1101

Wrinkle Department, American Gas Institute.....1101

EDITORIALS—

Briefly Told.....1101

Fourth Annual Meeting, Iowa District Gas Association—Mr. Philip Cross Again in Harness—Undetachable Services.

Proceedings, Seventh Annual Meeting, Wisconsin Gas Association—Official Report—Continued from page 974.....1102

First Day, Afternoon Session—Discussing Rules and Regulations Respecting State Control of Gas Service in Wisconsin—Speech of Prof. C. F. Burgess—Continuing the Committee—All the Money not Made in the Retort House.

Address of President Jansen Haines, Fourth Annual Meeting, Iowa District Gas Association.....1107

*Emergency Crew, Los Angeles Gas Company.....1108

*Some Recent Photometers and Illuminometers.....1108

Protecting Iron and Steel against Corrosion.....1111

SPECIAL ENGLISH CORRESPONDENCE.....1113

Gas for Ballooning—The Institution of Gas Engineers—Peat as a Means of Improving Coke.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.....1114

Address, Engineers' Club, Philadelphia, Pa.—A Lighting Hint from Toledo, O.—A Drastic Sample—Reorganization, Atlantic City, N. J.—Public Lighting, Sioux City, Ia.—The Brandon (Canada) Gas Franchise—The Best of Good Luck to Them—A Vicious Looking Ordinance—Death of Mr. E. S. Grander—Mr. Jenks Goes to Providence, R. I.—Mr. W. H. Snow's Prepayment Meter Estimate—Gas Franchise, Bremerton, Wash.—Personal—Contract for the New York Improved Equipment Co.—Annual Meeting, Ottawa, Ills.—Electric Schedule, Clarksburg, Va.—Annual Meeting, Claremont, N. H.—An Important Decision, New Jersey—May Increase Gas Rates, Laurium, Mich.—Judge Lansing's Decision—A Woman in Charge of an Irish Gas Works—A Mistrial in the Denver Insurance Case—And Other Items.

The Market for Gas Securities.....1116

[OFFICIAL NOTICE.]

American Gas Institute.—In the Matter of a Proposed Bulletin of Abstracts.

THE AMERICAN GAS INSTITUTE,
OFFICE OF THE PRESIDENT,
165 BROADWAY, N.Y. CITY.

To the Members of the American Gas Institute: Under date of June 1st, 1908, there was mailed to each member of the American Gas Institute a circular soliciting promises of subscriptions to a proposed "Bulletin of Abstracts," such circular being accompanied by a stamped and addressed return postal card for reply, upon which it was requested that each member should signify whether he would or would not subscribe. There were 1,150 of such circulars mailed. There were 225 favorable replies and 150 declinations, leaving 775 members who have failed so far to state their intentions.

Will not these latter kindly mail their replies at once upon the postal card provided, thus allowing the Institute to ascertain how many subscriptions can be counted on, and to determine whether the abstracts can be published or not? The Institute should have 75 more subscriptions.

ALEXANDER C. HUMPHREYS,
President.

[OFFICIAL NOTICE.]

Wrinkle Department, American Gas Institute.

To the Members of the American Gas Institute: All members of the Institute are earnestly requested to send in as soon as possible contributions for this year's Wrinkle Department report. The success of the Department depends entirely on the co-operation and assistance of the members.

Mail all contributions to Milan R. Bump, Editor, No. 60 Wall street, New York city.

BRIEFLY TOLD.

FOURTH ANNUAL MEETING, IOWA DISTRICT GAS ASSOCIATION.—The Fourth Annual Meeting of the Iowa District Gas Association was successfully held in the Hotel Rome, Omaha, Neb., on the appointed days. At this far cry from the meeting days (the dates were the 17th–19th June) it seems slow to mention that which was done. Our special correspondence regarding it did not come to hand until the 20th, or just a day too late for printing last week. However, it is our pleasant province now to state that the meeting was in every sense a success, and that the Omaha hosts of the Association were of the royal kind. President Haines did his work well, so did Secretary Vincent—it was well known beforehand though that they would. Mr. Euclid Martin, President of the Commercial Club, welcomed the members in a speech that enabled Mr. George McLean to return the former several Rolands for his Oliver. The fruiting of the paper list was equal to its blossoming in Secretary Vincent's advance notices, and the discussions on the many topics submitted were of a nature thoroughly going to show that the hearers were in prompt touch with the ideas of the writers. The officers elected were:

President.—A. T. Averill, Cedar Rapids.
First Vice-President.—George H. Waring, Omaha.
Second Vice-President.—Austin Burt, Waterloo.
Secretary-Treasurer.—G. I. Vincent, Des Moines.
Members of Council.—G. W. Clabaugh, Thomas Crawford and E. G. Pratt.

The attendance was a remarkably large one, the weather conditions were good, the housing was in every sense satisfactory, the business sessions were replete with interest and the social side was fraternal and enjoyable to the greatest degree. The banquet (over 70 shared its pleasures) was directed by Mr. G. W. Clabaugh, and he had to go straight, for in seats of honor were the Rev. T. J. Mackay, rector of All Saints' Church, and Judge Bartlett. The regrettable thing in connection with it was the unavoidable absence of Col. E. G. Pratt. The speech of Judge Bartlett was a beauty. Most of the delegates were initiated into the order of Ak-Sar-Ben (and it was the general consensus of opinion that Bo's'n Waring is a handy man with whom to sail the ocean blue. Another feature of the outing was a motor car ride to the works of the Omaha Gas Company, followed by an inspection thereof. The spirit of fraternity was beautifully shown in the election to Honorary Membership of that glorious vete-

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SMITHSONIAN DEPOSIT.

ran in the gas business, Mr. Isaac Battin, whose connection with it covers a period of quite 50 years. Hale and active he is, despite the 71 years that have been counted for him. Another pretty recognition of work well done was the presentation to Miss Luella Nash, who has reported the proceedings of the Association since its formation, of a handsome brooch. Mr. Jansen Haines was appointed to represent the Association on the Board of Directors of the American Gas Institute, and Waterloo was named as the next place of meeting.

MR. PHILIP CROSS AGAIN IN HARNESS.—Mr. Philip Cross, whose resignation from the staff of the Denver (Col.) Gas and Electric Company was reported in the JOURNAL some time ago, has been appointed and is now acting as General Manager of the New Business Department of the Consolidated Gas Company, New York city.

UNDETACHABLE SERVICES.—"I have read with much interest the article on 'Undetachable Services' that appeared in the JOURNAL for the 15th inst., which certainly shows a very ingenious and, in most cases, a doubtlessly efficacious method of attaching services to a steel pipe. I believe, however, that, for steel pipe up to 4 inches, it is better practice to put in your main a tee with the proper size branch at every point where there is a house or prospective customer for gas. This gives a connection that is equal to the full strength of the service pipe itself. If, however, after your pipe is laid, you wish to put on a service pipe, it has always been considered good practice to put on a malleable iron saddle, bolted to the pipe by double-end, U-shaped bolts and use a leaden gasket between the saddle and the pipe. The service pipe is then screwed into the saddle and a hole simply drilled in the pipe beneath it without any attempt to thread the hole in the pipe. In pipes larger than 4 inches, their sides are thicker and, therefore, give a better hold for the device that you describe. Furthermore, a saddle, with bolts, going completely around a larger pipe is, of course, much more expensive. The device you describe is doubtless all right, even with a 3-inch pipe, if the conditions are such that you could be sure your service pipe would never be disturbed and never subjected to any strain; but, sooner or later, in most cases there is danger of some lateral strain which, acting through the leverage of the service pipe, is likely to strain your thread and make it leaky. Of course, this may happen with any device, but in the case of natural gas, at least, I believe the stronger device is better up to 4 inches. I beg to take this occasion to state my firm belief in the wisdom of steel mains for artificial as well as natural gas. They are not only incomparably stronger than cast iron, but, if properly protected by cloth impregnated with pitch or asphalt, there is no limit to their life so long as they are protected inside by the continuous presence of gas. I do believe, however, that the compression coupling is better than a rigid joint, although, if buried sufficiently deep beneath the ground, it might be safe to have only one compression coupling every 100 feet or so. The larger your pipe the more danger there is of it tearing itself to pieces from expansion and contraction, if the joints are absolutely rigid, because the pipe itself cannot yield and thereby give the needful elasticity, as in the case of a smaller pipe that is slightly meandered in laying it. It is undoubtedly somewhat more expensive to lay steel mains swathed in cloth than cast iron, but the excellence and permanency of the job, the saving in leakage of gas, and in damages by reason of gas leakage, the saving on the occasional taking up of the mains for purposes of repair and other incidental savings, will, in the long run, greatly counterbalance the somewhat greater first cost; and I believe it would be an excellent thing in our large cities to have ordinances passed forbidding the laying of any more cast iron mains. It is perfectly possible to replace one joint, or 1,000 joints, of cast iron pipe by steel pipe, so an ordinance of this kind would not compel gas companies to throw their present gas mains on the junk pile, but simply to continuously improve them by the gradual substitution of steel for iron. In Paris they have a system of thin pipe, covered with a mixture of coal tar pitch and gravel, and I have seen a piece of this pipe that had been in the ground 60 years that was just as fresh as the day it was laid. The objection to this system is that any displacement of the ground cracks the covering of tar and gravel, and then the pipe speedily rusts through; but the instance above referred to proves that if a pipe can be adequately protected by pitch, there is no known limit to its usefulness and, with a cloth covering instead of gravel, you get the needful elasticity and avoid all danger of rupturing the covering under any ordinary conditions of service."—GODFREY L. CABOT.

[OFFICIAL REPORT.—CONTINUED FROM PAGE 974.]

PROCEEDINGS, SEVENTH ANNUAL MEETING, WISCONSIN GAS ASSOCIATION.

HELD IN MILWAUKEE, WIS., MAY 14 AND 15, 1908.

FIRST DAY—AFTERNOON SESSION.

DISCUSSING RULES AND REGULATIONS RESPECTING CONTROL OF GAS SERVICE IN WISCONSIN.

The Vice-President—The report of your Executive Committee calls attention to the appointment of a special committee to confer with the staff of the Commission in regard to standards. Prof. Burgess, of the Commission staff, who is with us this afternoon, has kindly offered to give us the views of the Commission as to what the standards should be. That is, he will give us a tentative idea of their views on the subject, not official, though. [Applause.]

Prof. C. F. Burgess—Mr. Chairman and gentlemen: I wish to express our appreciation for the courtesy which has been extended to the engineering staff of the Railroad Commission of Wisconsin, in inviting us to be present. The subject I have been asked to discuss relates to the rules and regulations for the control of gas service in this State. As stated by your Chairman, I have no formal report which will indicate definitely what the Commission is going to do in adopting definitions of adequate source, as formal recommendations have not been made by our engineering staff upon which they will base their recommendations. All that I can do is to express my own opinion, or perhaps I should say a summary of or deduction from opinions of various gas authorities who have submitted information to the Railroad Commission and its engineering staff. It appears desirable that whatever rules or regulations may be adopted shall interfere as little as possible with the regular routine of a company which is under good business management; that is, the present methods of management shall not be interfered with any more than is absolutely necessary. It will probably be desirable for the Commission to appoint a number of gas inspectors, whose duties will include periodic visits to the various gas plants of the State, perhaps once every 2 months, or at other desirable intervals of time. At these visits inspection will be made of the general service, and assistance will be given to the gas companies in keeping their apparatus in good standard condition by comparison with standards owned by the Commission. Inspectors may also investigate any complaints which have been made to the Commission as to inadequate service. In publishing rules and regulations it will, of course, be impossible to formulate them in such a way that they will meet all requirements and contingencies, and this is necessarily so for various reasons. At the present time we have not enough information upon which to base all details which it would be desirable to specify. As an illustration, nobody seems to know which is the best calorimeter to use, and, therefore, no recommendation or specification as to calorimeters can be made at this time. Calorimetry is a subject which is under investigation by the American Gas Institute, and by others, and when results of these investigations become available they will probably be made use of by the Commission. In considering the adequacy of gas service, various features thereof must be taken into account. One which perhaps presents itself first is the accuracy of meters; and the question is, what is an accurate meter? In the first place it is impossible to get a meter which is absolutely accurate, and if we had an absolutely accurate meter we have no means of calibrating it, without a more accurate standard than the ordinary meter prover. So, on account of the inaccuracies of measurement and the impossibility of having a perfect machine, allowance, of course, is to be made, and it is suggested that if a meter tests within 2 per cent. of the volume indicated by a good meter prover, that meter may for practical purposes be considered as correct. Then, it is not sufficient to define only what will constitute an accurate meter, because a meter, when it is tested and found to be accurate, may and probably will become inaccurate when it is placed out on service, after it has been in service a certain length of time. So that it is necessary to prescribe some other regulation which, if lived up to, will enable the companies to maintain their meters as close to this practical accuracy as possible. This can be done by repeated calibration and restandardization of the instruments by bringing them into the laboratory and going through the routine tests now commonly employed. It seems desirable that the companies should make at least one test on every meter in service in a period of time which may be 3 years. Three years is suggested because a number of companies are at the present time attempting to follow the practice of testing all meters once every 3 years. It is a debatable question a

to whether 4 years, or possibly even 5 years, might not serve the purposes as well. But certain it is if all the meters are tested once in 3 years, and not only tested but carefully readjusted at each test, the meters will be maintained in a fairly good condition. Each gas company should, of course, have an equipment necessary for testing meters, such equipment to consist of a standard meter prover with the suitable accessories. In addition to making periodic tests on the gas meters, tests should also be made upon request of consumers, and possibly a limit to the number of such requests be made; and it is suggested that tests should be made upon the request of consumers provided any one consumer does not make the request for test oftener than once in 3 months. A record of all tests of meters should be kept by the company, and where tests are made upon request of the consumer, report of such tests should be made to the consumer and to the Railroad Commission. This statement that I have just made, that all reports of complaints should be made to the Commission, is a good subject for discussion. It is not the object of the engineering staff of the Commission to make investigation of every complaint, but to have some means of knowing the nature and number of complaints which are made, and perhaps a classified report once a month would enable this to be done. It will also enable the engineering staff of the Commission having this report, to more intelligently conduct any investigation which they wish to make upon the adequacy of the gas service at any particular place. In case a test is made upon request of a consumer, and the consumer is not being satisfied with the report which is given him by the company, which of course will occasionally happen, that consumer upon application to the Railroad Commission can have his meter tested or other complaint investigated by the inspectors of the Commission. Under such conditions a fee should be charged, the charge being made against the consumer if he is in error and against the company if the error is on the other side. Each company should maintain its standardization apparatus in a condition of accuracy by occasional comparison with the standards maintained by the Commission, or other recognized standards. A gas company furnishing gas which within 1 mile radius from the distribution center gives a monthly average heating value of 600 B.T.U. gross, with a minimum never below 550 B.T.U., may be considered as giving adequate service as far as heating value is concerned. Gas companies whose annual output exceeds a certain amount, an amount which I won't attempt to give at the present time, should be equipped with standard calorimeter outfits with which periodic tests upon the gas should be made, a record of which should be kept. It is believed that to require every gas company to maintain a laboratory equipment would be an unwarranted hardship, and where companies with a small output do not have such equipment, then the tests upon service would have to be made either by inspectors which they employed, or preferably by inspectors of the Railroad Commission who visit the place from time to time. In reference to gas pressure, it seems that adequate service might be given by any company which does not allow the minimum pressure to fall below 1½ inches at the inlet of any meter on its system, or where the maximum pressure shall not exceed 6 inches at the inlet of any meter upon its system, and the variation in pressure at any one meter inlet shall never exceed 100 per cent. of the minimum pressure. The records of all tests, with the date and locality, should be kept open for inspection, and when tests are made upon complaint as to the quality of service, a copy of the result of the test should be furnished to the consumer making the complaint and to the Railroad Commission. As to the purity of the gas it is suggested that the gas should contain in no case more than 30 grains of total sulphur per 100 feet, and not more than a trace of sulphureted hydrogen. It may be noted that no recommendation has been suggested as to candle power, the reason being that, under the condition of the manufacture of gas in this State, it appears all those consumers who are using an open flame burner will be assured of a candle power of a reasonable amount, provided the gas is maintained at an average heating value of about 600 B.T.U. No suggestion has been made as to limitation on the amount of ammonia which should be allowed. Perhaps that should be included; but in my opinion it seems hardly necessary. As stated before, I hope these various points will have full discussion. Mr. Brown has made a criticism upon the suggestion that the companies furnish a copy of the results of all tests and complaints of service, and I am sure that there are other good suggestions and criticisms that could be made. [Applause.]

The Vice-President—I am sure Prof. Burgess's remarks are of great interest to us, and he wants our assistance in determining just what his recommendations shall be to the Commission. In other words, if there is anything inconsistent in any way in the suggestions he has made, he wants to know it. We should be glad to hear from Mr. Brown.

Mr. R. B. Brown—Two or three points I made note of for discussion. As regards the period of routine test, so-called, at which all meters should come in, I feel that, from our own experience with it here and such analysis as we have been able to make of the results obtained by testing and overhauling meters on a 3 and 4-year basis, there is very little difference. As a matter of fact the companies for their own protection should, and I think most of them do, overhaul all their large meters, and their heavily loaded meters, and meters operating under particularly bad conditions, such as in gas engine work and heavy furnace work, quite frequently. We are doing it in Milwaukee oftener than once a year, and we have to do it for our own protection. These meters are very likely to become non-registering, and our practice for a number of years has been in such places to set the meters in batteries, so that it is not necessary to shut off the factory, or engine or consumer of whatever character, in order to change the meters. One can be taken at a time. By so doing we are able to change meters at any time at our convenience, and we have made it a practice to do so a good deal oftener than once a year. On these routine tests on large meters we invariably find a good many non-registering and meters that are almost as bad that do not register the first 30 per cent. of their capacity, perhaps. These large meters under heavy loads are seldom found to run fast, and if they are, of course, we make the same adjustment with the consumer as if he had made the complaint and caused the test to be made, so that there can be no complaint made from either side, and no criticism of the frequent testing. Then the meters that come into your shop from ordinary changes should be tested and overhauled as thoroughly as if coming in for routine tests. Meters are returned to the shop so frequently, by reason of removals of tenants, and constitute such a large percentage of the total number of meters out in most towns, that when you talk about a 4-year routine test, unless these other items be considered, it is apt to be misleading. As a matter of fact if your routine test is made on a 4-year basis you would find, by a careful analysis of your meter figures, that probably the average time for which your meters were out would be in the neighborhood of 2 years. Of course, if they were taken in on a 3-year basis that would still further reduce the average time outstanding. But we have found from our own records that the difference between a 4 and a 3-years' test is not material, except that the shorter period very largely increases the cost. I think that Prof. Burgess and the fellow members of his staff agree with me that if we cannot show a definitely improved condition of the average meter outstanding by increasing the cost of overhauling to that extent, we would not be warranted in doing it. The Professor has stated that authorities differ on this thing as much as from 3 to 5 and 6 years, but I do not think that 4 years is very far wrong. As to reporting to the Commission each individual complaint and its treatment and settlement, I do not believe that is practicable. All over the State there would probably be several thousand complaints a month, which are treated and handled and settled. For the Commission or any member of its staff or employee to digest that mass of information which would be sent in, and get anything out of it that would mean anything to them or would enable them to know more of the service, I think is almost out of the question. I would suggest in place of that they call for an analysis of the complaints month by month. We get out such an analysis for our own information. It shows the total number of complaints, how they came in, so many by the window, so many by the telephone, so many by mail; it shows a general division of the character of complaint, and it shows the number settled, the number shown to be without cause, the number simply requiring adjustment of burners or mixers, the number requiring a burner man's attention, and the number, which I think is extremely few in this town, that are caused by main troubles in the streets; it also shows the number of complaints caused by stoppage of service, whether by frost or otherwise; and I should think that such an analysis as that would be of benefit to every company to keep (and many of you are keeping them undoubtedly) and that would give the Commission or its staff at a glance a very clear idea of the character of service and the character of trouble, one from the point of view of the consumer and the other from the point of view of the gas company. Another point is brought up by Prof. Burgess's statement. He calls attention to the possibility of the State's meter inspector or the State's inspector of service, adjusting differences between companies and consumers, where the company's test meter has not proven satisfactory or been accepted as final by the consumer. One thing that must be clearly

borne in mind in that connection, however, is that a meter which has been out any length of time will not preserve its proof for any considerable period after it is taken off the premises and allowed to stand. It is a fact, as Mr. Dickey states in the paper which he will read here to-morrow, that meters which have been removed from premises do not hold their conditions as to proof very long. There are a number of reasons for that which I will leave to Mr. Dickey's consideration, but I may call your attention to the fact that if a meter's diaphragms are bleached by the evaporation of volatile oils from the diaphragm leather after the meter has been removed and put in a shop where the temperature is higher than where the meter was set, those diaphragms may shrink and the meter will become faster after standing on the shelf for a time. On the other hand, meters that are standing idle in a dry place will frequently evaporate some of the more volatile portions of the oil deposited on the valve seats and the valves will stick and the meter will show non-registering; the valve arm will buckle up and shorten the stroke, or a number of other accidents may happen to the internal mechanism, which will make a meter, which has been registering approximately correct, show non-registering or very far out on the division of the valve setting. Now, if this adjustment is to be made by the State inspectors it must be done pretty promptly; that is to say, it would not be fair to the gas company or consumer (and we cannot tell which way the meter will give trouble) to have that adjustment deferred for a considerable time, and the meter allowed to stand on the shelf awaiting retesting; but that is simply a practical question. It can be done that way. I would not want to say the proportion, but nearly all meters will show faster after 2 weeks or a month's standing on the shelf than when originally taken out; and in other cases we will find non-registering meters which registered until taken out. We can prove all this by our records if anyone wants to examine the matter. I agree with Prof. Burgess as to the candle power. The modern user of gas cares very little about the candle power. If you took a census of burners in use in this State, you would find that, while there are very large numbers of flat flame burners in existence on fixtures, yet an accurate analysis of the amount burned for lighting purposes would show that the proportion of gas used in flat flame burners is very small as compared with the amount used in Welsbachs or burners of a similar character. The man who uses gas for long hours, or requires a large amount of light, is forced to use the Welsbach type of burner, because it gives him greater efficiency and saves him money, and the only thing that he is interested in is the purity of the gas as regards dangerous or harmful ingredients as shown in the products of combustion, and the amount of heat which he can get from a given quantity of gas consumed. Therefore, in the matter of candle power I think Prof. Burgess has taken the modern and broadest view; that is, that the candle power, if the heating values called for are sustained, can never be low enough to fail to furnish satisfactory light for the purposes to which a flat flame burner is now put, and for all other purposes the only other thing we are interested in is heating value. Regarding the question of sulphur left in the gas, the cheapest and the only way we know of of purifying gas to-day practically is by iron oxide purification. If that purification is carried to such an extent as to leave only a trace of hydrogen sulphide in the gas, all we have left is a portion of sulphur bicarbide, and of that we have no control. At times, owing to the character of coal or the temperature of the retorts, the CS, will run up—we cannot take it out anyhow—and I believe that even 30 grains will be exceeded by some companies occasionally for a short time, and it seems to me that the Commission, if it adopts this suggestion of 30 grains, is taking the broadest view of the matter, though it has not gone then as far as the English authorities, who have removed all sulphur restrictions except as to hydrogen sulphide. As to the ammonia restriction, I think it makes little difference. In a well managed coal gas plant ammonia is worth money, and will be taken out if possible; and as it is so easily taken out there is no reason why it should not be. The only time you would find more than a trace of ammonia in finished gas is where there has been some accident, oversight or stoppage of some kind on the condensing system. Therefore, it matters very little to the gas man, and I think it matters little to the public, whether that ammonia restriction goes into the rulings of the Commission or not. The ammonia would not be in the gas in either case, save under exceptional conditions, where possibly the company would have to be forgiven for its lapse in any case.

Mr. H. L. Rice—On the question of total sulphur it seems to me the Commission would be consistent if it would treat that as it has heat units; namely, make the 30 grains average and provide a maximum which should never be exceeded, rather than simply name 30 grains as a single specification. That would take care of occasional instances, as Mr. Brown says, when 30 grains might be temporarily exceeded. On the time of meter removals I can only say that I have been impressed by the examination of the reports on our 30,000 meters, removed periodically every 4 years, where the very large percentage of those meters will test within 2 per cent. either way, and I have become convinced that a 4-year period of removal for ordinary meters is ample in every respect. The Commission suggests, as I understand it, that if a consumer is not satisfied with a company's report of its test, he may complain and have the meter reserved—I presume that is implied—and tested by the Commission. In that case, I think it should also provide a maximum time in which he should be allowed to file that complaint. I know that, although we provide in our reports to consumers, and send out to all consumers, a notice that they may be present at all tests of meters regarding which they file complaints, we find it very hard to get the average consumer to pay any attention to it or take any interest in the process; and it would be very difficult to get the average consumer to complain within a reasonable time, if he is going to make a complaint, and if he comes back at some long distant time the meter might not have been reserved. Therefore, it seems to me that specification should be put in.

Mr. David Douglas—While I agree with all that has been said, I would like to emphasize the importance of requiring a deposit whenever anyone registers a complaint regarding a meter and wants it tested, to show that the customer believes honestly in his complaint. It is very common for men who make complaint that when we test their meters they will not look at the test, and will not believe what you report about it. Now, when a man makes a complaint of that kind, and you say, "We want so much money and we want you to be present, either personally or by proxy," that moment you will find the number of demands for meter testing will shrink very quickly, and, therefore, that money should be put up and the complaining customer should be ready to pay a reasonable sum, and he ought really to be present personally or by proxy when the test is made. The making of a list of all complaints that come into a gas company's office would, in my opinion, involve a great deal of work. The classification suggestion made by Mr. Brown is a good one; but what has the Commission to do with complaints, about burners, for instance? The only point on which any complaint should be recognized is with respect to the meter, and complaints regarding varying pressures, and a classified list of these should be preserved for reference. If we are to have regulation the Commission would want the information, so that they could go into any gas plant to find out whether or not there was real cause for complaint. I presume it is only such complaints as that were intended by Prof. Burgess; not all complaints, including burners. Stoppages in house pipes do not concern the Commission, who do not propose to regulate them or take any cognizance of them. Complaints of fast meters are almost universally caused through what customers claim are big bills. The customer says my bill is too big, and the meter is, therefore, wrong. But shall we take cognizance of a complaint of that kind not backed up by the man who says, I will put up 50 cents, 75 cents or $1 to show that I believe my complaint is a just one. He withdraws his complaint the moment you ask for money. Should that be reported to the Commission? The man does not believe it himself to the extent of 50 cents. But if complaints were limited to *bona fide* matters concerning the working of the regulations of the Commission, I think it is only reasonable that the Commission should get all that information tabulated for it in any shape it wants, and have the same kept for it. I am thoroughly of the opinion that the working of the Commission in those matters is going to be very beneficial to the companies, and that we should, therefore, be ready and willing to do everything in reason that the Commission may want; and I am quite sure the Commission would not want to bother with a lot of stuff that does not concern it. I hope a reasonable price will be fixed for taking off and testing the meter, and if the customer will not put up the money necessary for that work, the complaint should be disregarded as not *bona fide*.

Mr. R. N. Kimball—Where these meter tests are made at intervals of 3 or 4 years, and a meter is found a certain percentage fast, is any specification as to penalty or rebate suggested by the Commission?

Mr. L. S. Bigelow—Connecticut has done this work, and I was asked to look over a recommendation of a certain Board of Trade there, having in charge the matter of considering a Commission. In that document this Board of Trade recommended that every complaint should be made in writing, and that every complaint where a test was necessary should be accompanied by a charge of 50 cents, the cost of

testing the meter, that amount to be returned to the complainant in the event of the meter being found inaccurate, the company being reimbursed if the meter was found correct. That recommendation was sent in from a particular city on that point.

Prof. Burgess—Is that a charge made by the company or by the proposed inspector; that is, was the recommendation to the effect that the companies should charge their consumers a certain amount for making the test?

Mr. Bigelow—That the Commission should make the charge.

Mr. Burgess—But in the ordinary routine of a company's business, would you recommend that it make a charge for testing meters?

Mr. Bigelow—Yes; and refund the money if the test shows the meter wrong.

Mr. Douglas—It is really a deposit, not a charge.

Prof. Burgess—Then, if the meter is correct, the money is forfeited to the company?

Mr. Bigelow—Yes.

The Vice-President—Prof. Burgess, do you care to answer Mr. Kimball's question?

Prof. Burgess—It will be noted that nothing has been said regarding penalties. I prefer not to speak of penalties, because we have not been thinking of them, and I could not speak intelligently.

Mr. Kimball—I meant allowances. Our regular method is, when a meter is found fast, to allow the customer credit for whatever the meter is fast, covering a period of 3 months previous to the test.

Prof. Burgess—That appears to be a general practice, and if it is a good practice, there is no reason why all companies should not live up to it; but I did not have in mind any rule at the present time which should require companies to do that. It seems a matter of business management rather than a question for State regulation. I fear I do not thoroughly understand the recommendations made with reference to charging for the testing of gas meters. It has been my impression that many companies will test a consumer's gas meter free of charge on request of the consumer, and I did not know there was a general practice for companies to charge a fee for making that test. It seems to me undesirable that that should be done. Certainly I believe, when an inspector of the Commission is called upon to make a test, that a fee should be charged, to be paid either by the consumer or by the company, whichever was in error in the matter; and Mr. Brown has suggested that where such complaints are made to the Commission, the Commission's inspector ought to make that check test immediately after the company has made its test. It does not seem to me that this would be a very serious matter, although it might be if no rule were provided for the time in which this test must be made by the inspector. I would like to ask Mr. Brown's opinion as to whether a very large number of complaints would come to the Commission under this proposed scheme; that is, if the companies paid careful attention to the complaints, as they should, how many consumers will come away from the companies dissatisfied to the extent of wanting to pay a fee to another inspector to make the test?

Mr. Brown—In answer to that question there would not be very many. Our experience has been, and it has been suggested by Mr. Rice, I believe, that, while our regulation provides for an invitation to the consumer who has complained of his meter, to be present at the test, it is very seldom one is present. It is only where we find a consumer who is disposed to combat our test, or to act as if he did not believe that test was conclusive, and we go after him, and almost insist on his being present at the test, that he sees the test made. I say, it is only those occasional cases where the test and the adjustment based on that test are not accepted. How many consumers there are, however, who in their own hearts are not satisfied, and who if they thought they had some one further up to appeal to, would take that appeal, I do not know; but I do not think there are very many. As a matter of fact with the most unreasonable of these consumers, who practically refuse to take any stock in our test at all, if we can get them to the meter shop, we usually settle the matter satisfactorily. When necessary, or when it is insisted upon, we have even taken the meter prover apart, so that the customer could measure it up, as he wanted to, then he expressed himself as satisfied. At the same time I think there is some ground for apprehension in the point that has been brought out about a ruling being made requiring gas companies to test free of charge consumers' meters at frequent intervals. We have a few "chronics" who come in about every so many months, no matter whether they have any excuse or not, and ask to have their meter tested, and it is easy to see that if the Commission should give official approval to that sort of thing we might be put to an enormous expense in shifting meters unnecessarily. And when it comes to this question of fee I can see the Professor's point of view. The State does not want to send an inspector out on this kind of work at the State's expense and have the thing amount up to a heavy sum. It feels that if the Commission is called upon to adjust the difference between the company and the consumer, the fee, from whomsoever it comes, should go to the State. That is all right enough, too; but suppose that, from the making generally public of these regulations, and calling attention to the possibility of meters getting out of order inside of 3 months time, a general wave of dissatisfaction should go over the community, and we should be called upon to test ourselves and then retest before the State inspector a great many meters, who is going to pay the gas companies' portion of that expense? The idea just occurred to me that it might be worked something like this: The company's expense would not be less than 50 cents for its share. Now, the retest will give the gas company only a few cents, and it would seem as if a deposit should be made on the consumer's part. The gas company would make, say, one test a year free; that is reasonable. If the consumer appeals from that test, or wants more than a test a year, let him put up a deposit of $1, of which, if the meter is correct, 50 cents goes to the gas company and 50 cents to the State inspector as a fee. On the other hand, if the meter is against the gas company that deposit is returned to the consumer and the gas company will pay the 50 cents fee to the State inspector. In that way both the expense of the gas company and of the State inspection is taken care of, and the fee is not exorbitant. A man, however, who has to put up $1 to have a gas company say whether his meter is correct or not, well be pretty sure that he is right. In most cases a little checking up on the part of the consumer will show that he is wrong. But what percentage of our consumers could read their meters if they had to? Those who think they have a grievance should be instructed to check up the meter, and be shown how to do it, and they will do that if they have to put up $1 before a test is made. In New York for a great many years the method was that on complaint the gas company removed the meter and sent it to Albany for inspection. A fee, I believe, of $1 was charged for inspection, or it may have been $1 plus the express charges both ways. That was a rotten state of affairs. That meter might leave your plant in first-class condition, and the check test you would always make on it would show the meter "O. K.," but it would get to Albany in bad condition. Then when the meter came back and you tested it it would not come within gunshot of the Albany test, simply because of handling in transit. Of course we do not want any such foolish provision as that, and I believe the company has just as much right to have its unnecessary expense taken care of by the consumer as the State has. There are two sides to that question.

The Vice-President—I agree fully with all that Mr. Brown and the others said with regard to the companies reporting their complaints to the Commission. While we try to avoid having complaints, and perhaps come as near to it as the majority of companies, I have known times in the winter, when we were having considerable trouble with frost, that several hundred complaints were made in one day. Now, the individual complaint, or a list of the individual complaints, would be of absolutely no value to the Commission. Possibly a record of the total number might be of some value to it, and it seems to me that a report, such as Mr. Brown suggested, would meet the requirements of the Commission generally, and if it found any particular company was having more complaints than it ought to have, the Commission could go into further detail with reference to that company. I do not know of any company that has ever made a charge for testing its meters regularly. I think the charges have always been made by some official inspector, or the deposit made to recompense the official inspector for his work, and refunded to the consumer if the meter was incorrect, and paid by the consumer if the meter was correct. I am sure you all agree with me that we greatly appreciate having Prof. Burgess here to outline the views of the Commission as to standards, and I suggest that he be thanked with a rising vote.

Motion made, seconded and unanimously carried amid applause, thanking Prof. Burgess for his address.

Mr. J. Corscot—It occurs to me that, inasmuch as the staff of the Commission is desirous of getting all the light it possibly can on this subject, and we are desirous of having whatever regulation is made just and fair to the companies as well as the consumer, it would be well to have a committee appointed from this Association, of which Mr. Brown shall be Chairman, to confer with the staff of the Commission from time to time, to point out anything that it may be impossible to comply with on the part of the companies or that may be improved by change. I believe that the staff is looking for informa-

tion, and we are looking to be fairly dealt with by the Commission, and I think it is so disposed. We all need light, and I think this committee would do a good deal to bring about a right understanding and advise the staff of the Commission of what it is possible for us to comply with and what it is impracticable for us to accomplish.

Continuing the Committee.

The Vice-President—I think it would be perfectly proper for you to make a motion to the effect that the old committee be continued. The committee consists of Mr. Brown, Chairman, and Messrs. Douglas and Klumpp.

Mr. Corscot—I move then that the committee be continued, that is, if it would be acceptable to staff to confer with them, without dictating, of course, but to advise with them on any question that might come up, as to the ability of the companies to comply with such regulations as the Commission might be disposed to make.

Prof. Burgess—We have had some valuable help from this committee and hope to have more. We invite all the information on this subject that may be contributed.

The Vice-President—The motion is made and seconded that the committee appointed at a special meeting last fall to confer with the Commission on the matter of standards be continued.

[Motion carried.]

All the Money not Made in the Retort House.

The Vice-President—It was said that the money of the gas companies was made in the retort house. Possibly some of you still think so. We have several gentlemen with us who think otherwise, and the result has been the organization of a Commercial Gas Association to which all representatives of gas companies I believe are eligible as members, and they are undertaking to do a work for the companies which has not been taken care of by the regular Associations in the past. We have with us to-day the Secretary of the National Commercial Gas Association, and as he would like to tell us something of their plans for the future, I am sure you will listen to Mr. Bigelow with great interest.

Mr. L. S. Bigelow—I was very much interested when I took up my morning paper to-day to note just what is being done in the East room at the Capitol in Washington. The President has called together the governors of the several States of the Union, and 41 governors, according to the newspaper statement, assembled in that room to meet him and to discuss commercial problems. Not alone were those governors invited, but, by special invitation, several leaders in the commercial workings of this country were asked, such as Mr. Carnegie, Mr. Schwab and others. These men are there to consider, among other things, the maintenance and the reinstating of forests, not simply because of the timber that is coming on in later years for use, but in order to maintain waterways, and in turn thereby to maintain cheap shipping rates, the forests being necessary to the maintenance of the waterway. They are there to consider the matter of waste of raw materials, coal, iron, natural gas, etc. It is a commercial proposition, and the very fact that the President of the United States has called together the governors of these various States, and has asked them to consider with these commercial men such topics, at once stamps the proposition of "*commercialism*" as well worthy of consideration upon the part of associations and of bodies of men who are interested in buying and selling. The first gasholder, as I remember having read, was a bladder, just 100 years ago. Compare that with some of the immense holders of to-day, and we have a very forceful illustration of the progress made in this industry, a monument to the capabilities and the capacity of the gas engineer, and a monument to the old gas associations, that have helped so materially in disseminating this information that has been gathered by one and another gas engineer, and which through the association has been made a part of other gas men's knowledge. There was a time when the rubbing of two sticks together was the means of producing a flame to light the torch that, in turn, through its own smoke sought to illuminate the surroundings, but to-day we can step to the wall, in gas practice, and touch a little white button, and, by compressing a tiny column of air, can illuminate an enormous auditorium, either with the open flame or with the incandescent mantle, and by pushing a little black button we can extinguish either at a distance. That is one step in gas commercialism. Another: There was a time when the blackened cauldron hung on a tripod over faggots, and hot ashes or a smoky flame were the only means of cooking. Compare these methods with a gas range of to-day, with its broiler and its oven and its warming oven and its top, where anything that can be cooked, may be cooked. Compare that method of heating water with the method of to-day, when a man may go to a third story room, if he choose, and turn a faucet without a particle of fire in his house, excepting a tiny pilot flame, in an automatic, instantaneous water heater in the cellar, and in a few moments have intensely hot water in his washbowl. When we compare these conditions we find erected a monument to the commercial side of the industry. I claim there are two sides to this industry, although I remember there was a time not long ago when it was said that the gas field was a unit, there were no two sides, there was not a commercial side, there could not be a commercial side, and there should not be a commercial side. But when people are determined things sometimes develop that seem almost impossible. It was said to me 3 years ago, or a little over that time, that it would be simply impossible to create a commercial organization in the gas field. The idea, it was said, was entirely absurd. It was claimed to be unnecessary, but it seemed to me that one single purpose in an association was a most desirable thing, so I went to work at it. Soon after the work was contemplated, of forming a commercial association, the other three national associations talked of uniting, and it looked to me as though possibly in that uniting process there might be evolved an Engineering Association which should compare in this field with like bodies in other fields; for instance, the engineering association in the electrical field, in the civil engineering field, in the mining engineering field, etc., and by degrees it has seemed as though that condition would yet possibly come about. The American Gas Institute has already selected and made its headquarters in the United Engineering Societies' Building in New York, a splendid home for engineering associations. It has put itself on a par with similar organizations in the other fields by so doing. But when so put on a par with other engineering associations it must to a large extent eliminate the commercial, since the two things, engineering and commercialism, do not wholly harmonize in one body. While the engineer perhaps looks upon the appliance man as not below him in station, not below him in ability, yet the appliance man and the engineer are somewhat like water and oil, in an association—they do not mix well. When you develop an association that is substantially composed of only the appliance manufacturers and the commercial men of the gas company, and when you say the "commercial man," you mean any man in the gas company interested in the sale of the gas company's product—when you get a gas association wherein those two elements, the manufacturer and the middle man (and the gas man is a middle man) can get together on an equal basis to discuss the problems of appliances, introduction of appliances and advertising to sell gas, then you have an association of "mixers," one that has but a single purpose, and that one purpose as expressed in the slogan, "The creating of sales of millions of feet of gas where thousands are sold to-day." That slogan, without official adoption, has become the slogan of the National Commercial Gas Association. I venture to say that in the days of Aladdin and his wonderful lamp, and the days of Jack and the beanstalk, there were no propositions more remarkable—although the achievements as described in those books used to seem almost impossible to us—than that very ability on the part of a man to-day to step to a button and to push that button and by that means compressing a tiny column of air instantly, almost before thought, to illuminate a great auditorium by means of burning gas flames or incandescent gas mantles. Then, again, I doubt if in those days there was anything more wonderful pictured than the ability of a man to take in one hand a small electric torch, showing absolutely no color, no flame, no fire at the instant, and with the other hand to turn a little cock on a gas range, releasing an invisible commodity, then with a tiny electric spark caused by pressing a button on the torch to ignite the invisible, producing instantly a flickering blue flame so intensely hot as to make possible the rapid cooking of whatever you may desire on your table. I do not believe that in those days there was anything more remarkable than the ability of a man to step to a faucet and turn on cold water with absolutely no fire in the house other than a tiny pilot flame, far away, and in a very few moments to have steaming water come from that same faucet, the heating appliance at a distant point controlled entirely by his turning on or off of the water. These are wonders, among many other commercial gas wonders. Now, let me ask, whose brain is responsible for the working out and making of those marvels of to-day, those Aladdin's lamps of to-day? Is it the gas man's mind? No. Whose mind? It is the appliance man's brain. The appliance man sat up nights to devise these things; the appliance man thought of them when eating his meals; the appliance man dreamed of them

and saw them when reading his daily papers; he has lived with them, and what is the result? That the gas man of to-day has at his disposal marvels for the converting of his element into light, heat and power. Wherefore, since the appliance man has this inventive and constructive ability, and since the appliance man has the ability to maintain and successfully conduct a commercial business in these days when competition is so keen, and furthermore, since the appliance man after having expressed his ability to devise and to put his creation on paper, and to carry it through the pattern shop, through the foundry and to finish it in the machine shop, has the nerve or ginger to next day throw it into the scrapheap because it is not good enough—and then has backbone and determination and sticktoitiveness enough to go at it next day, notwithstanding this loss, with the purpose to reconstruct and reconstruct until he finally produces a perfect article, then is not that man's unlimited ability of value to the gas man in Association work? That is the point I wanted to bring out. The ability of the man who produces these articles, who is able to conduct business in these days of keen competition and is able to meet these hindrances without being feazed, is not that man's ability such as should be gathered in to a Gas Association? If it is desirable that such should be gathered into the Association and made use of, then where could it best be centralized? Could it be an engineering association or a combination association, or best in a national commercial gas association, where nothing is talked of but commercial matters? In the National Commercial Gas Association we do not intend to discuss the retort, nor the laying of mains, nor any of the problems of the gas house, or of conveying the gas to the curb; but from the time it leaves the curb until the time it is converted into light, heat and power, the subject is considered. We consider the appliances required. It is here that the appliance man and the gas man coming together discover to one another the imperfections in one another's appliances and methods, and by discussing these imperfections each sees himself, his methods and his devices as others see them, and each is thus better able to improve his appliances and methods than formerly. Furthermore, when the two brains are put in touch, the one is sure to point out to the other unseen possibilities and the other to propose devices that never have been made to accomplish certain ends and yet are needed. The appliance man is almost sure to take up these ideas and to test, and if practical to carry them out; this he does at his own expense. The gas man, it seems to me, ought to welcome and encourage the appliance man in every possible way, because of the fact that the appliance man bears the expense until the device is perfected, when he turns it over to the gas company, which is greatly benefited by the introduction of the appliance. I do not mean to suggest that the appliance man has not stood on a very pleasant footing with the gas man, but when I first came into the field and began to look it over, to see whether there was a commercial proposition in this field that might be worked out, I found the appliance man practically a "camp follower" in the association work; he was not able to come upon the floor to take part in the discussion; he was not able to do the full work of an active member, with the exception, as I remember it, of one association (in that association all men were equal), but even there a very large proportion of the topics presented and subjects discussed were of an engineering type. The National Commercial Gas Association has just one thing in mind, to advance the commercial side of this great industry. The Association was formed 3 years ago and has held three meetings in New York city, January, 1906, 1907 and 1908. It was criticised because it took the name "National" and yet stayed in New York. I want to say here just what I said in Chicago at the Illinois Gas Association meeting, "When a bird is young it is a great deal better for it to stay in the nest until its pinions are well developed, until its wing feathers are well grown, and not to try to get out of the nest, to fall and be injured." We waited in New York, the place of the birth of the Commercial Gas Association, until the Association was strong enough to go outside and perform a good work. The Illinois Association voted, at its meeting in Chicago a short time since, to invite the National Commercial Gas Association to hold its next meeting in the city of Chicago, December 8th, 9th and 10th. The invitation was carried back to New York. The Directors of the National Commercial Gas Association met and they have agreed upon Chicago as the place of meeting. They have agreed upon the date of meeting, the 8th, 9th and 10th of December. Supposing I should not be called upon until to-morrow, I have not a letter with me written by Dr. A. C. Humphreys, President of the American Gas Institute, but I can tell you the gist of it. Dr. Humphreys stated that the Directors of the Institute met in New York, March 17th, and there unanimously voted to express their wish to co-operate with the National Commercial Gas Association, and to withdraw the exhibition of appliances that had been proposed for their October meeting in New York, and in place, to appoint, according to our suggestion to the Institute, three members from the Institute, who would be three of a committee of seven, the title of the committee to be the Exhibition Committee of the National Commercial Gas Association, for its meeting in Chicago; the balance of the committee, four in number, to be appointed by and from the National Commercial Gas Association. The President of the Institute appointed Mr. H. L. Rice, of Aurora, Ills., Mr. W. J. Serrill, of Philadelphia, Pa., and Mr. V. F. Dewey, of Detroit, Mich. Mr. Rice who is here is one of that side of the committee. The side of the committee appointed by the President of the National Commercial Gas Association includes Mr. John C. D. Clark, of Chicago, Mr. Chas. E. Emmach, of Chicago, Mr. Brundage, of Milwaukee, and Mr. Henry D. Schall, of Detroit. These seven men, therefore, form the Exhibition Committee for that convention, and I assure you that both the convention and exhibition are going to be a very great success. There will be exceedingly clever papers read and able discussions participated in, and the exhibition will be held in some large auditorium, perhaps one of the armories, or fully as large a place as that. Therefore you can imagine that the display will be well worth coming to see. Devices will be shown that you never have seen, and devices will be there that you will not see if you stay at home. In closing I desire as Secretary of the National Commercial Gas Association to urge upon you, not only your attendance at the meeting, not only your attendance at the exhibition, but as well your memberships in that Association. Just as many members as we have, means that much active "push" in our Association; and no one can appreciate "push" more fully than the Western men. Therefore, I want to ask just as many as will, to use application blanks with which you will all be provided. If we can have you with us, your names and work, and then your presence, we shall be exceedingly glad, and I am positive that your attendance in Chicago will fully repay you for the time and expense. [Applause.]

The Vice-President—Those of you who visited the gas exhibition in New York some 10 years ago will, I am sure, enjoy visiting the exhibition in Chicago also, and those who did will get double enjoyment out of it. We are greatly indebted to the appliance men for much of the growth of our business at this time; and they need our encouragement to continue the work they have been doing, and not only continue along the same lines, but to improve upon them and do more of it. The electrical people are working constantly to bring out new devices for the use of electricity and to get greater efficiency in every way, and if we are going to hold our business we must do the same thing. We must aid the appliance men in every way we can, and I believe the average gas man can furnish more ideas in a minute than the ordinary appliance man will work out in a week. [Laughter.] In your behalf I want to thank Mr. Bigelow for telling us about the work of the National Commercial Gas Association, and to express the hope that we will all be down there to see him next December.

On motion, adjournment until 10 o'clock next day was ordered.

[To be Continued.]

Address of President Jansen Haines, Delivered on the Occasion of the Fourth Annual Meeting, Iowa District Gas Association, Des Moines, Ia., June 17th to 19th, 1908.

I do not wish to burden you with a long address, for you are all familiar with the general objects of the Association work. This work naturally resolves itself into the various branches of the gas industry as our Association grows and as the industry expands. I believe that it should be the duty of this Association to further the development of the various branches of the gas business by those best fitted to each branch, that standing committees should be nominated for the various branches, and that the result of their investigations should be reported upon at each one of the Association meetings in the form of a paper, so that all members may benefit by their work.

I would suggest as subjects for these committees to consider:

1. Gas Works Construction.
2. Gas Manufacture.
3. Gas Distribution.
4. Commercial and Office Expenses.
5. New Business.
6. Accounting.

There is no reason why these committees, if desirable, should not overlap—that is, a member of one committee may belong to another—but the idea of the development of our Association should make for efficiency, and efficiency should be the motto in the mind of every member.

Although our Association has only been organized 3 years it has prospered exceedingly. The territory includes a large number of small towns that are growing very rapidly, and the problems which arise each year can be considered to the advantage of all the members by free discussions at our annual meetings. To this end I will urge each member of this Association to bring before our meetings any matter of interest to the gas business he may possess and let us have a full discussion upon it.

One of the timely subjects that is just now engrossing the minds of all the public service corporations is the question of raising new capital to enlarge their business as required by the rapid growth of

our cities. The recent legislative attacks on corporations, which have aggravated the unfortunate general business depression through which we are now passing, have also greatly increased the difficulties and the cost of raising additional capital. The promulgators of these attacks, in an endeavor to become popular idols, continually avoid or misrepresent the real facts in the transaction of our business, thus bringing discredit on corporations which furnish to their very constituents the greatest boons to mankind.

I believe that it should be our aim at all times to bring before the public the fact that in no other line of business is continuity and uniformity of service so zealously maintained, the safety of the public so well provided for, and the accuracy of our method of measurement and charges for service so complete in every detail as in the gas business. I might add that in no other country in the world to-day is the price of gas as low as in the United States, when the service rendered is taken into consideration. When we hear of the cheapness of gas in England, Scotland and Germany, a comparison of the wages paid for labor reveals the fact that a day's labor in those countries will purchase less gas than in the United States.

It is also evident to anyone, who stops to consider, that the men engaged in the management of gas companies are selected because of their integrity, business capacity and knowledge, and that these qualities alone fit them for handling a business which always ranks among the foremost in size and importance of any in their community. These are all subjects to which I would refer any member of the Association for further thought and study.

The question of our working along the lines of standardizing practice in distribution construction is one which I wish to bring before this meeting for consideration. A large amount of work is being done by a committee of The American Gas Institute in this direction, and while it will require careful study, I believe that we should give it attention and co-operate with the Institute in an effort to help the committee who has it in charge.

A communication requesting the privileges of affiliation with The American Gas Institute has been acted upon favorably to your Association by the Institute, and your Secretary will report thereon. The advantages of this affiliation are so obvious that it is very gratifying to me to be able to present it to you at the present time.

In conclusion I beg to call your especial attention to the papers which have been prepared for this meeting with great care, and which show a thorough consideration of the subjects involved. I trust they will receive the discussions they merit. The meeting is now in your hands.

Emergency Crew, Los Angeles Company.

The Los Angeles (Cal.) Gas and Electric Company is in the field with an emergency crew and equipment, which were fairly and successfully tried out about a fortnight ago, in the presence of the Mayor, the Chiefs of Fire and Police, the head of the department of parks, the city engineer, etc.

The emergency vehicle is an excellent 30-horse specimen of the Rambler touring car, the body and running gear of which are painted a bright red. The ordinary tonneau has been removed from it, in

place of which has been substituted a special compartment attached to the rear, properly fitted to hold and carry a full equipment of fire fighting paraphernalia. The forward or front part of the car is of the ordinary type, but its center is arranged for the immediate use of a varied and complete emergency department kit of apparatus. The car proper can carry the driver and an assistant, two firemen can easily ride on the foot board, and, if necessary, two or three others can ride on the box. A special feature, as will be seen in the engraving, is a tank of oxygen, strapped securely to the side of the conveyance. The car, when not out in search for trouble, rests on the road directly in the rear of the Company's beautiful office building on Hill near Seventh street, with two men—the driver and his aide—always stationed by it or in it. The working crews comprise 8 drilled men, divided into two shifts of 4 men. The kit, it should be further added, holds a small fire extinguisher of the chemical type, an assortment of medical stuffs, etc. The operative working is about like this: Immediately on the receipt of word respecting a fire, leak, burn out or other trouble, the crew is called into action, and by the time the telephone operator has secured the details regarding the trouble, the machine is cranked and ready to start. As the machine is equipped with a 10-inch fire gong, and has the right of way in the street the same as fire apparatus, the length of time required to reach the consumer is reduced to a minimum. Arriving at the site of trouble, the foreman locates the party telephoning the complaint, and ascertains the cause. If it is from leaky fixtures or appliances or defective inside wiring, the necessary remedy is quickly applied and the crew returns to the station, first ascertaining over the telephone if any more orders have been received for the emergency crew.

If the trouble is in a street main or service pipe, the driver, who always carries a book containing the names of the Company's employees, hurriedly collects help from among those residing in the vicinity. The emergency crew is instructed to respond to fire calls, a fire alarm bell being in service at the crew's station, and the quick arrival at fires of trained handlers and controllers of gas and electric currents is admitted by the Los Angeles authorities cannot fail to be of almost immeasurable value to the firemen and to the property holders.

Some Recent Photometers and Illuminometers.[1]

The instruments exhibited at the Municipal Exhibition may be classified as photometers and illuminometers respectively, *i. e.*, instruments intended for the measurement of the light giving capacity of sources and instruments for the measurement of illumination. Attention may first be concentrated on the various photometers exhibited at the exhibition. Nearly all the photometers in practical use at the present day may be included in the divisions of "equality of brightness," "contrast," and "flicker" photometers, and examples of all these three classes were shown.

In Figs. 1 and 2 are shown a recent type of Bechstein instrument, which can be used either as a contrast photometer or on the equality of brightness principle.

The plaster of Paris prism G is illuminated by the rays from the two sources J_1 and J_2, to be tested. The rays from the illuminated photometrical surfaces then traverse first the lens O, then the two biprisms Z_1 and Z_2, and finally the lens L on their way to the eye of the observer at A. The dividing lines of the prisms Z_1 and Z_2 are perpendicular to one another. Thus in the diagram the edge of the prism Z_1 is visible in Fig. 1 and the edge of the prism Z_2 is not, while in Fig. 2 the reverse is the case. The angles of the prisms are so adjusted that the prism with its dividing edge vertical, Z_2, divides the field of view into two equal portions, the left region being illuminated by rays from the left side of the ritchie wedge G, and the right region in the same manner by rays from the right side. The second prism Z_1 exerts a similar action, its dividing edge being, however, horizontal. As a result the field of view is divided into four quadrants which appear equally bright when the photometer is in balance as an "equality of brightness" photometer.

The contrast element may, however, be introduced by merely inserting two thin squares of glass, K_1K_2, in the path of the rays illuminating two opposite quadrants, as shown in Fig. 3. A small percentage of light is absorbed in this way. Fig. 4a indicates the appearance the field of view will now assume the photometer being in balance, and Figs. 4b and 4c show its appearance when slightly disturbed from this position in either direction.

Many different forms of flicker photometers are now available. Two of the most recent types, those due to Dr. Bechstein and Mr. Wild respectively, were shown at the exhibition. The earliest flicker photometers may be divided into two classes, those in which the photometrical surfaces themselves were moved, as occurred in the Whitman sector photometer, and those in which a lens or prism was oscillated in front of the dividing lines between the illuminated surfaces in the photometer, as in the instrument devised by Prof. O. Rood.

The Bechstein flicker photometer utilizes a modification of the Rood

1. "The Illuminating Engineer," London, England.

device. The optical arrangements are shown diagramatically in Fig. 5. The two sides of the wedge G are illuminated by means of the two sources to be compared, J_1 and J_2. The path of the rays from the photometric surfaces to the eye is then as follows: The rays pass through the lens L_1, then through the prismatic arrangement Kk to the eye-piece lens L_2, and ultimately to the eye at A. The prismatic arrangement Kk consists of a prismatic annulus K, the angle of which is so chosen that in the position shown only the rays from the right side of the wedge are brought to the eye-piece. Within the annulus K is fixed the disk k, which is likewise prismatic, having an angle of inclination equal to, but in the reverse direction to that of the annulus. Consequently only the rays from the *left* side of the prism passing through this disk are brought to the eye-piece. The result is that the eye sees a field of view similar to that shown in Fig. 6a, the center of the circle being illuminated only by rays from the left hand source and the outer ring only by means of rays from the right hand source. If the prismatic arrangement Kk is kept stationary we can employ the photometer on the "equality of brightness" principle, and obtain balance by judging when ring and center appear equally illuminated.

In order to obtain the flicker the prismatic disk Kk is rotated about a horizontal axis by means of a band from a small motor passing over the pulley R. It will now be observed that when the disk has rotated through 180°, the rays of light which formerly illuminated the center now illuminated the ring, and *vice versa;* the field of view is, therefore, now that shown in Fig. 6b. Hence, when the disk is rotated at a suitable speed, ***both*** ring and center will appear alternately dark and bright, and a flicker will be seen which only disappears when center and ring are equally bright.

In the model shown in Fig. 7 the motor is arranged in such a way that the whole instrument can be easily reversed without the observer being required to change his position at the bench.

A very simple modification of the Whitman method is due to Mr. Wild, who merely rotates a paper disk, half of which is greased and half plain, as shown in Fig. 8, illuminated on each side by the two sources of light to be tested in the ordinary way. The observer looking down a telescope sees, in rapid succession, first the greased and then the plain portion reflected in the inclined mirror M, as shown in Fig. 9. The photometer is thus extremely simple in construction, and it is said that very great sensitiveness can be obtained when a suitable grease spot screen is employed. Another advantage claimed for the instrument is that the rays from the two sources of light to be tested strike the surfaces of the disk vertically, as is the case with most photometers of the equality of brightness or contrast photometers, and that, therefore, the possibility of "angle-errors" is much reduced. Fig. 10 shows a general view of the most recent type.

Some description may now be given of the various instruments for the measurement of illumination exhibited. The Trotter Universal Photometer is shown in Figs. 11 and 12. The comparison source of light is in this case a small glow lamp L, the rays of light emitted by which strike the mirror M, and are thus reflected on to the white diffusing screen S_1, receiving the illumination it is desired to measure. The observer looks at the white diffusing screen S_2; in this is cut a small aperture with very sharp edges. The observer is thus able to compare the brightness of the actual illumination of the surface S_1 with that of the screen S_2. The latter can be rotated so that the light strikes it at various inclinations, and the illumination is thus altered through a definite and convenient range from zero to 2-candle feet. The actual value in candle feet is obtained by observation of a pointer attached to the screen S_2, moving on a scale on the outside of the box containing the photometer, as shown in the diagram.

The small glow lamp is carefully aged and standardized, and, in addition, is run at such an efficiency as to give a light intermediate in color between that of an underrun glow lamp and the whiter light of the arc. As a result no very serious difficulty is experienced by a practiced operator in using the instrument with the range of color occurring in the case of the ordinary illuminants in use for street lighting. In order to facilitate the comparison of such sources, however, a modification to the conditions suggested by Crova is obtained by using yellow screens of varying depth of color, the percentage of light absorbed by which has been previously ascertained. If, for instance, the light striking S_1 is yellower in character than that striking S_2, S_2 may be slightly yellower than S_1, so that the two screens appear very nearly the same color. After making the measurement we should then allow for the fact that the coefficient of reflection of the yellower screen S_2 is less than S_1, the necessary correction being marked on the screen used.

In order to use the small glow lamp no more than is actually necessary, and thus at once to reduce the gradual fall in candle power of the lamp with use to a minimum, and to economize the use of the small accumulator supplying current to it, a small spring key is provided; by this means the lamp is lighted just as long as may be necessary in order to get a reading. Owing to the small length of time for which the lamp is in use its candle power only varies very gradually. However, the possibility of such a change, or of the pressure of the battery falling below the correct value of 4 volts, is provided for by means of the scale at P, which enables the lamp to be brought nearer or further from the screen S.

The general working of the Martens illuminometer will be understood from Fig. 13, which shows a general view of the instrument, and Figs. 14 and 15, which represent a sectional plan and elevation.

The plaster of Paris surface F receives the general illumination the intensity of which it is desired to measure. The rays from this surface pass into the telescope of the instrument at b, its brightness is compared with that of the frosted glass m, illuminated by the small benzine lamp B, the rays from which enter at a. The flame height of this lamp is regulated to exactly 20 mm., this height being controlled by observations through the window at D. The rays from the benzine lamp, before proceeding to illuminate the plate m, must suffer reflection from the pair of mirrors S_1, S_2, as shown in Fig. 14. By moving these mirrors to and fro by means of a rack and pinion arrangement we can weaken or strengthen the brightness of the illuminated plate m, and can determine the relative values of the intensity of illumination, corresponding to equality of brightness in the field of view, by means of a scale calibrated direct in lux.

This alone, however, would only enable the comparatively small range of illumination of 15 to 1 to be measured, and, therefore, a disk r is inserted in front of the plate m. This disk contains a series of graduated smoked glasses, the densities of which are such that the illumination read upon the scale must be multiplied by 0.01, 0.1, 1, 10 and 100 respectively. Special provision is made for the measurement of the intensity of unknown sources by means of the cap shown in the diagram containing the diffusing semi-transparent screen H This cap can be fitted on in front of the aperture H_1.

Another accessory, specially intended to facilitate the comparison of lights differing in color, is the introduction of a pair of red and green glasses, either of which may be inserted in the eye-piece of the telescope. The observer then takes a reading, firstly, looking through the red glass, and, secondly, through the green glass. The mean of these two results is then assumed to be a measure of the relative total intensities of the two illuminations compared.

In Figs. 16 and 17 will be seen the general arrangement of the Harrison street photometer. The standard of light is again a small glow lamp L, which receives current from a small accumulator within the instrument, and which illuminates the moveable screen S_1. S_2 represents a white sector disk (*i. e.*, a disk from which two symmetrical sectors are cut out) which is driven by means of a small air blast at any desired speed; on this screen is received the illumination which it is desired to measure.

The eye of the observer at E sees, in rapid succession, first the illuminated white surface of the sector S_2, and then, in the mirror M, the illuminated surface of the screen S_1. All that is necessary, therefore, is to alter the inclination of the screen S_1 until no flicker can be perceived by the eye. The surfaces S_1 and S_2 then appear equally bright. The actual illumination at the screen S_1 can be read off by the reading of a pointer attached to S_2, and moving on a scale graduated in candle feet. In the postion shown in the diagram the photometer is arranged to measure the intensity at an angle of 45° to the vertical, but, by tilting the photometer, the intensity at any measured angle may also be obtained.

The method of producing the air blast, by the action of which the rotating sector is driven, is shown in Fig. 17. The apparatus merely consists of a rubber tube terminating in two balls which are controlled with the hand. The upper one of these serves to maintain the requisite pressure, and retains the speed constant while a reading is taken, the lower one being pressed in the hand in such a way as to accelerate or retard the speed as may be required. The small glow lamp in the photometer is put in circuit by inserting a plug key into a socket on the outside of the instrument. When measurements are not actually being made this plug is removed and the connection broken. In order to secure a wider range of measurement two alternative lamps of different candle power are usually provided, either of which can be lighted at will by the insertion of the key into one of two distinct sockets. Illuminations up to 5-candle feet can be determined.

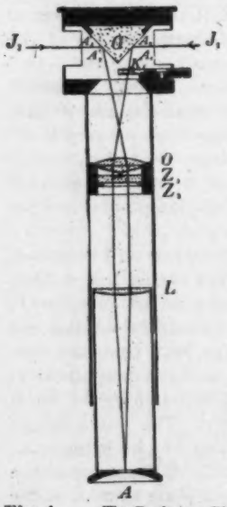

Fig. 1. The Bechstein Photometer.

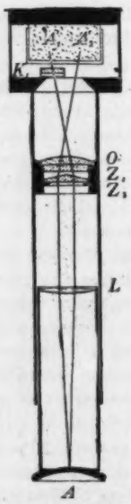

Fig. 2.

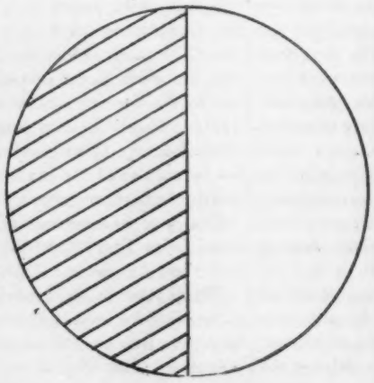

Fig. 8.

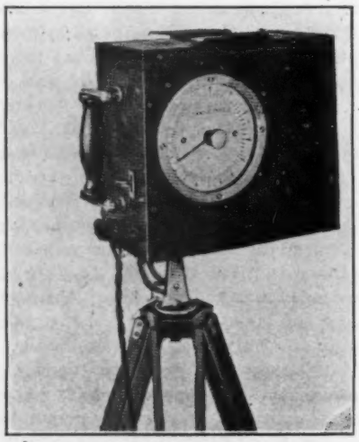

Fig. 11.
Trotter Universal Photometer.

Fig. 4a.

Fig. 4b.

Fig. 4c.

The Bechstein Contrast Photometer.

Fig. 3.

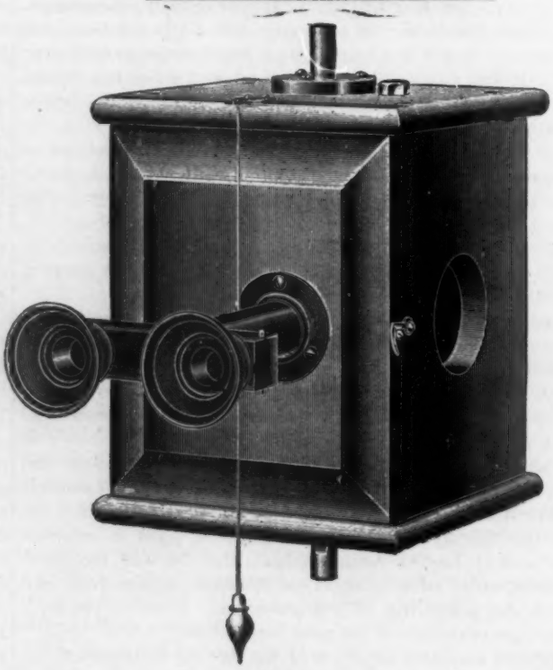

Fig. 10.
The Wild Flicker Photometer.

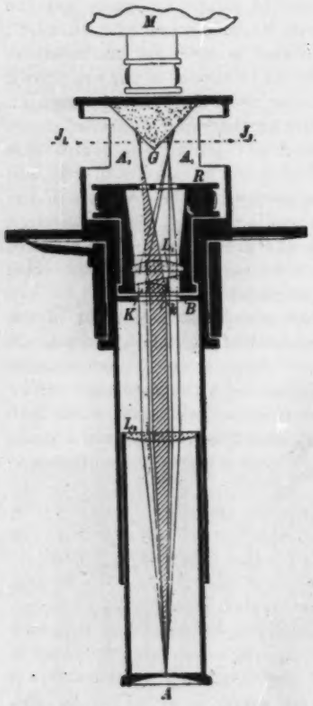

Fig. 5.—Bechstein Flicker Photometer.

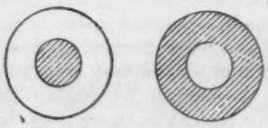

Fig. 6a. Fig. 6b.
Field of View, Bechstein Flicker Photometer.

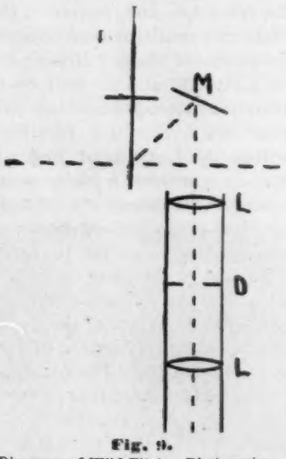

Fig. 9.
Diagram of Wild Flicker Photometer.

Fig. 13.
Marten's Illuminometer.

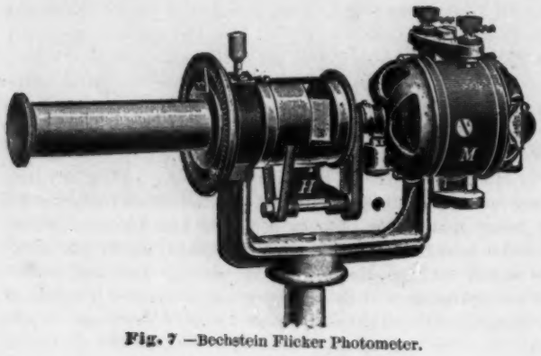

Fig. 7 —Bechstein Flicker Photometer.

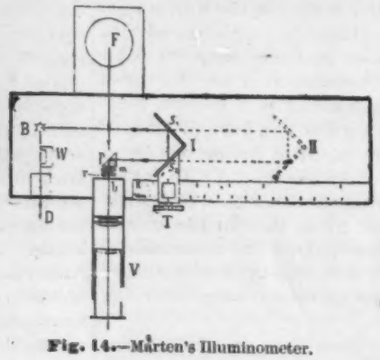

Fig. 14.—Marten's Illuminometer.

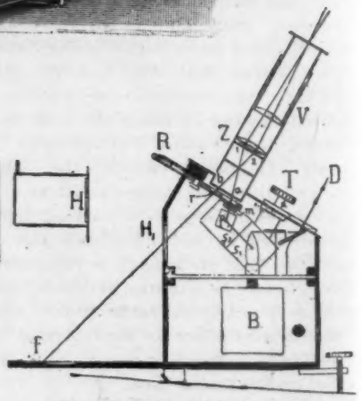

Fig. 15.—Marten's Illuminometer.

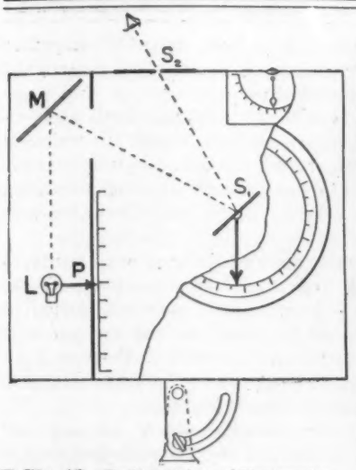

Fig. 12.—Trotter Universal Photometer.

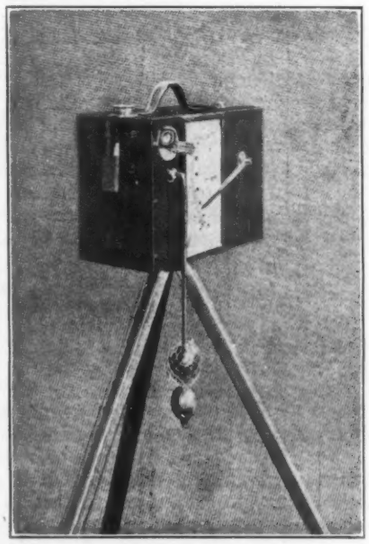

Fig. 16.—Harrison Street Photometer.

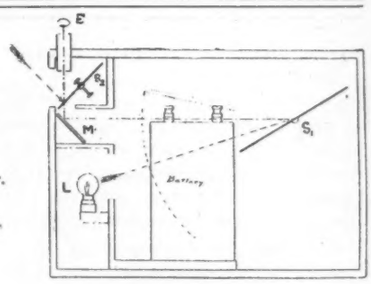

Fig. 17.
Harrison Street Photometer.

Fig. 18.
Thorner Illumination Tester.

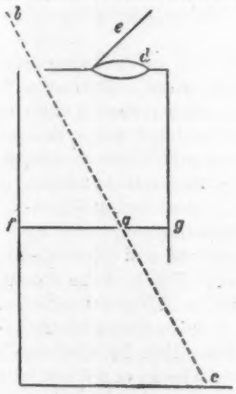

Fig. 19

Fig. 20a.

Fig. 20b.

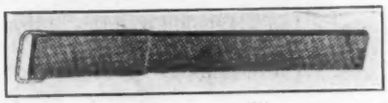

Fig. 21.

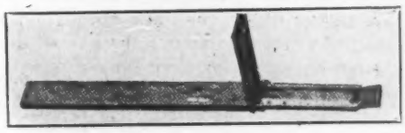

Fig. 22.

Simplex Photometer.

The ingenious little apparatus shown in Figs. 18 and 19 is intended to enable a rough idea to be formed as to whether the daylight illumination in a room is satisfactory or not. The instrument really compares the brightness of an image of the sky with the actual illumination to be examined. The inclosed box shown in Fig. 18 contains a sheet of paper *fg* with a fine aperture at *a*. Vertically above this fine aperature *a* is to be found a convex lens *d* and an inclined plane mirror *e*, which can be rotated about both a horizontal and a vertical axis. The aperture *a* is situated at the focal length of the lens *d*. A second paper surface at *c* receives the available intensity of illumination to be examined.

An observer, looking along the direction of the dotted line *bae*, sees the surface *fg* and this second surface through the aperture *a*. He then turns the mirror *e* in such a way that an image of a portion of the sky is formed on the region of the paper screen *fg*, adjacent to the aperture *a*. He now judges the value of the existing illumination by merely observing whether the surface illuminated at *c*, seen through the aperture, appears brighter than the image of the sky formed on *fg*, or *vice versa*. If it appears darker, as shown in Fig. 20a, we say that the illumination is too weak. If, on the other hand, the spot appears brighter, as in Fig. 20b, the illumination is judged to be sufficiently bright. Of course, it may happen that *no* portion of the sky is visible from certain positions in a room. When this happens, however, we are safe in condemning the daylight illumination in the room without further test.

As the standard brightness of the image of the sky is to some extent an arbitrary value, several stops are provided, which correspond to illuminations in the ratio 1, ½ and 2. Determinations are best carried out in cloudy weather. Naturally precautions must be taken to avoid abnormal conditions. The effects of a heavy fall of snow, for instance, and the light reflected upwards as a result, would cause an abnormal distribution of illumination in the room tested. In the same way results obtained when the sun is streaming direct into the room will be too high, while, in the case of a clear sky, the process of testing is somewhat affected by the fact that the image of the sky appears a different color to the aperture.

Finally, mention must be made of the Williams Simplex photometer. The photometer is stated to be mainly intended to measure the relative brightness of distant sources of light, such as railway or marine signal lights, etc.

The method employed is merely that of extinction, and consists in passing a specially prepared photographic film, increasing gradually in intensity from one end to the other, before the eye, until the source of light becomes indistinguishable. As shown in Fig. 21 it may be carried in the pocket. When in use the cap covering one end is removed and attached to the instrument in such a way as to screen the eye, which is applied to the small aperture which may be seen in Fig. 22. With the other hand the photographic film is then gradually removed from the instrument until the light is just cut off. Then, without moving the glass wedge, the instrument is removed from the eye, and the relative degree of obscurity of the film required to cause extinction inspected through the sight-hole, also shown in Fig. 22.

Fig. 23.

The numbers on the film correspond to stellar magnitudes, that is to say, the relative values of the intensity increase in geometrical progression in a ratio of about 1 to 2.5, a difference of 5 magnitudes thus corresponding to a ratio of 1 to 100.

It must, of course, be understood that the readings are only intended to be *relative*. Thus the absolute brightness of the light depends upon the state of the atmosphere, while different people, whose eyes differ as regards sensibility to light, will naturally obtain different readings, though the *relative* results obtained by each person should be the same.

Protecting Iron and Steel Against Corrosion.

[Contributed to the Proceedings of the Franklin Institute, by Mr. George B. Heckel.]

All forms of rust depend for their formation on the fact that oxygen in solution in water enters readily into combination with iron, and that carbon dioxide and other acids in the atmosphere may act as promoters and modifiers of the process.

Formerly, it was supposed that iron immersed in pure water *in vacuo* would not rust; but Whitney and Cushman have conclusively shown that iron does pass into solution in pure water without the presence of free oxygen or other agent, and this fact opens the way to an entirely new method of protection, which we shall consider at greater length as we proceed. Hitherto the problem of protection has been regarded as merely a problem of isolation, the exclusion of moisture and oxygen, and doubtless if we could effectually and per-

manently exclude the agents of rust we could preserve our material indefinitely.

Two methods of isolation are generally employed, either separately or simultaneously. The interposition of a film of paint between the surface of steel and the atmosphere or the deposition of a firmly adherent film of non-corroding metal in the same position, as in the coating of roofing sheets with tin and lead and the deposition of a film of zinc in the so-called galvanizing processes.

Regarding the latter, which may be very briefly considered, it is worthy of note that the new process for coating a surface of steel with a film of zinc by subjecting the steel plate to a low heat in contact with zinc dust seems, from the meager reports at hand, to give promise of excellent results in the future. In this process, it is said, the zinc penetrates the steel to an appreciable extent and forms a continuous film of metal over its surface. If this process shall be made commercially available there is no apparent reason why steel so coated shall require further preliminary protection, the deficiency of ordinary galvanized iron being apparently due to the imperfect continuity of the zinc coating.

A steel surface properly covered with a coating of metallic zinc and insulated from contact with other metals should need no further protective coating for a long period. Mr. Stone, of the New Jersey Zinc Company, tells me of galvanized roofing plates that remained in service for 16 years, and then were put out of service only because the building was demolished. But manufacturers have learned how to economize zinc since those days, and the zinc coating no longer fully protects because it is too thin and is not continuous.

Still another method of coating steel with metallic zinc is the electrolytic process. Advantages of economy as well as of purity and homogeneity of coating are claimed for this electrolytical or cold process galvanizing. The claim of superiority at least would seem to be justified by the results with these small samples, which have been immersed in water for over 3 months without showing signs of rust. One specimen had its uncoated end protected with paraffine wax, the other was not so protected. The process is said to be applicable to any size or form of steel. What I wish here to emphasize is the fact that a properly galvanized metal surface needs for long periods no additional protection. Paint may be applied for decorative purposes, but is unnecessary at the beginning for any other use.

The problem of protection by painting metallic surfaces comprises several important factors, differing materially from the conditions presented by a surface of wood. In the latter we have a more or less absorbent or porous surface, every minute aperture of which affords a hold for the film of paint. Furthermore, the co-efficient of expansion for any wood under change of temperature is so low as to be negligible. If we can exclude moisture from the painted wood the protective coating is subject to practically no stresses or strains.

Steel, on the other hand, presents to the eye an intact surface. It is only under magnification that we detect its actual irregularity. Two forces probably tend to hold a film of paint in place on such a surface: First, the hold of microscopic projections from the under surface of the film on the irregularities of the metal surface, and second, the force of cohesion or atmospheric pressure.

The co-efficient of expansion for steel, within the limits of range for atmospheric temperature, is high; far higher than that of any known paint film. This deficiency in the latter must be compensated for by elasticity. The film must be sufficiently elastic to accommodate itself to the constantly changing area of the surface to which it clings, without rupturing the film itself or the minute projections by means of which it clings to the surface.

Finally, since moisture, acid, ozone and perhaps other atmospheric agencies are at least the principal causes of rust, the protective coating must, in so far as possible, be impermeable by vapors and gases.

From the stated difference of the two surfaces it is readily deduced that a paint to penetrate and secure a firm hold on the microscopic irregularities of a steel surface must be different from a paint intended to penetrate and adhere to wood, while the rigidity of the one as contrasted with the softness of the other would indicate other differences.

Mr. Job in a paper read before this body some 2 years since, admirably illustrated from practical experience the necessity of a high degree of comminution in protective paints for metal surfaces. The differences in the behavior of the paints contrasted by Mr. Job would seem to depend first upon the excess of vehicle (the elastic element) in paints compounded with finely ground pigments, and secondly, in the smaller area of the voids between the particles of pigment in the paint film. For, as Dr. Dudley has so often and so admirably demonstrated, linseed oil is to a surprising extent permeable by moisture, and it is the province of the pigment to a large extent to compensate for this quality of linseed oil by presenting a series of impenetrable layers of pigment to the atmospheric vapors.

In the early days of English and Scotch steel ship building it was the custom, which still prevails to some extent, to give all steel members while hot a shop bath of linseed oil. In that case it did not prevent rusting, but entailed much labor to remove it. The coating was not protective and had become so brittle that it would have formed a very unsafe foundation coat.

In the practice of some firms it is the custom to give all structural steel a shop coat of red lead and linseed oil. This practice is far less objectionable, as red lead does at least make a good foundation for subsequent painting. As to the relative merits of red lead and other pigments, the subject is too wide for me to handle. Perhaps if red lead were always mixed fresh on the ground and applied while freshly mixed, there would be much less room for controversy.

We now come in the course of our review to one of the most interesting developments of modern paint chemistry, a development which may eventually solve our problem, leaving nothing for future workers, or which may prove a mere *ignis fatuus* of science, like so many apparent discoveries which have preceded it.

During the year 1905, Dr. Allerton S. Cushman, of the Department of Agriculture, in the course of certain investigations connected with the corrosion of fence wire and steel sulverts, made a special study of the curious fact that the corrosion of steel is inhibited for a time by treatment with chromic acid or a soluble chromate. Other investigators had from time to time referred to this peculiar condition of passivity, but, so far as I know, Dr. Cushman was the first to investigate its causes and to supply a satisfactory explanation.

The complete theory is beautifully demonstrated and illustrated in Bulletin No. 30, issued from the Office of Public Roads of the Department of Agriculture, and everyone interested in the preservation of metals should read this bulletin, because it is full of noteworthy information and suggestion. It is only fair to say that Dr. Cushman's deductions have been attacked and that his theories have not met with complete acceptance. Nevertheless he has certainly demonstrated some important facts, whatever may be the ultimate fate of his explanations.

It occurred to me, for instance, that in estimating the effect of the various atmospheric agencies in corrosion it would be instructive to run a series of duplicate tests in which the effects of the various atmospheric influences should be segregated. Accordingly I requested Mr. Gardner of the Scientific Section of the Paint Manufacturers' Association to ascertain for me with small steel plates cut for me from the middle of the same bar.

In every case the passage of an electrical current from a sal ammoniac cell, averaging 1½ volts, very materially assisted corrosion.

The experiments were duplicated precisely, with the addition of potassium bichromate to the water in each case. The original plates were cleaned and the tests duplicated after sufficient bichromate to make a 1 per cent. solution. After 30 days no rust had appeared in any of the test bottles, even the electric current having failed to start corrosion. These experiments, I think, prove conclusively that the presence of a soluble chromate will inhibit corrosion and beautifully support Dr. Cushman's claims.

What has been so far accomplished has been largely the result of empirical observation. This haphazard observation has, however, brought forward some significant data, which it remains for the trained investigator to classify and from which he may gain an inkling of the basic governing principles.

Sabin, for example, long since demonstrated the fact that a coating of tough varnish applied hot to iron pipes prevents rusting in a marked degree. Toch has pointed out the fact that steel rods imbeded for a long time in concrete showed little corrosion on removal. Several observers have proved that oxide of zinc, lampblack and some other very finely divided pigments under certain conditions are highly protective. The protective value of red lead freshly mixed before application has long been recognized. Scott, in an address before the Master Painters' Association of Wisconsin, stated that steel shutters painted for the J. I. Case Company with basic lead chromate gave protection twice as long as any other material used, etc.

These and many more familiar instances would seem to indicate that we are at last in a position to lay down tentatively, at least, three conditions as necessary for the protection of steel from corrosion. We will briefly consider these conditions:

1. *Isolation.*—The surface must be shielded as effectively as possible from the access of moisture and atmospheric agencies. This in-

volves the necessity for a paint coating less permeable than linseed oil alone; sufficiently elastic to accommodate itself to the continual expansion and contraction of its support. This coating must furthermore be permanently adherent and must retain its elasticity during a reasonably long time. Fine grinding of the pigments used, the addition of China wood oil, varnish gums, and perhaps even a heavy neutral petroleum oil, used under proper conditions, may help us toward this end.

2. *Insulation.*—If it be found, and it seems to be well established, that the passage of an electric current through the members of a steel structure promotes corrosion, it is evidently a part of our task to reduce as far as possible this element of danger.

3. *Immunization.*—This is to most investigators a new field with unknown possibilities. If it be found, as indicated in Dr. Cushman's experiments, that the mere presence of certain pigments in the paint film tends to retard corrosion, the converse is also probably true that the presence of other pigments tends to facilitate it. The pigments given in Dr. Cushman's list are all expensive, but it is probable that if there were any considerable demand for zinc chromate, for example, the price would soon fall to a moderate figure, due to increased production.

I was personally so much impressed with Dr. Cushman's original paper and with Mr. Scott's experimental confirmation following so soon after, that having occasion to supply a formula for a protective paint for use by the New Jersey Zinc Company, I suggested the following: 40 pounds American vermillion, 10 pounds red lead, 5 pounds venetian red. Zinc oxide and lampblack to produce the required tint or shade. Grind in 1¼ gallons of raw linseed oil, increasing the quantity as required for added zinc oxide or lampblack, and ¼ gallon crushers' dryer. For use, thin with raw oil and very little turpentine or benzine.

This is Scott's formula slightly modified. I am inclined to believe that the substitution of zinc chrome for the American vermillion, of any high grade, finely ground iron oxide for the venetian red, and of American vermillion for the red lead, would improve the protective value of the formula, while I also believe that the addition of a very little kauri gum varnish, if zinc oxide is used, would be found advantageous, and that the substitution of a certain proportion of China wood oil for some of the linseed oil would improve the wearing qualities of the paint.

Dr. Cushman in reviewing the formula, points out two dangers confronting us when we attempt to base an inhibitive formula on commercial products. The first is that all carbon pigments, excepting pure graphite, may contain sulphur compounds easily oxidizable to sulphuric acid when spread out as in a paint film. The second is the probability of variation in the composition of basic lead chromate or American vermillion.

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, June 10th, 1908.

Gas for Ballooning.—The Institution of Gas Engineers.—Peat as a Means of Improving Coke.

I have already drawn attention to the fact that the use of coal gas for balloons is rapidly coming within the range of practical politics, and now observe that an unprecedented event in this connection took place in London on Saturday week. No less than 31 balloons, requiring in all some 2,000,000 cubic feet of gas, were filled within the space of 8 hours, on the grounds of the Hurlingham Club, without any hitch or difficulty. Arrangements had been made for a race, not in the matter of speed as usually understood, but with the object of descending as near as as possible to an agreed site already located, at a distance of 30 miles from the starting point. The honor of winning was nearly divided, two of the balloons being dropped at about 1¼ miles from the winning post. The start was made at 3 P.M., when the first balloon was set free, and the remainder followed at 3-minute intervals. It is stated that the largest number filled at one time on any previous occasion, in any part of the world, was 21. The entries included all sorts and sizes, ranging from 80,000 cubic feet down to 8,000 cubic feet, but it will be observed that large sizes were principally favored, as the average is well over 60,000 cubic feet. The usual size up to the present has been 20,000 cubic feet to 40,000 cubic feet, and anything beyond that was called a monster, so it would appear that ideas are going in the direction of large balloons.

The site comes within the district supplied by the Gas Light and Coke Company, and the special arrangements necessary were carried out under the supervision of the Chief Distributing Engineer, Mr. G. F. L. Foulger. As the ordinary distributing system would obviously be useless for such a large delivery, it was necessary to tap the nearest high pressure main, which in this instance was a 36-inch pipe conveying gas from the works at Beckton to the the gasholders at Fulham, a distance of some 15 miles. This necessitated the laying of a special 12 inch high pressure main about a mile long. A run of over 200 yards of 18-inch pipe was laid down, with a sufficient number of 3-inch outlets, half showing one way and half the other, for the balloons. The 12-inch main was brought up alongside and connected at intervals. Arrangements were, of course, made for the supply of straight coal gas, as any admixture of water gas would add considerably to the specific gravity and therefore be a serious objection. The initial pressure available was over 60 inches of water, which sounds formidable as compared with our usual ideas of distributing pressure, but really only amounts to a very few pounds per square inch. Part of the pipes, etc., were of a temporary character for this occasion only, but about half of them are to remain permanently for future use, from which it will be seen that the Hurlingham Club is now in a position to offer almost unique advantages for balloon races or ascents, and it must be a great satisfaction to aeronauts to know that such ample arrangements are provided for their requirements.

At this season of the year the mind of the manager of gas works, who has been running his daily round uninterruptedly for several months, naturally turns towards plans for holiday and recuperation. Anyone who is so fortunate as to have about 6 weeks to spare for this purpose can find ample occupation from now up to the end of July. First of all there is, of course, the programme issued by the Institution of Gas Engineers. The usual meetings and functions are to be held in London on the 16th, 17th and 18th insts., on the first 2 days at Westminister, and on the third at the Conference Hall of the Franco-British Exhibition. The technical exhibits, to say nothing of other attractions at this extensive undertaking, will require a few days, and in this connection those who are so fortunate as to possess wives and daughters, will find that the ladies will not forget to advance claims for a look in, that it will be difficult to resist. The attractions of the Franco-British enterprise have been so extensively advertised that the usual explanation to the effect that it is only a collection of gas apparatus and machinery will not go down. At least such is my own personal experience. Some time ago I attended a "strictly business" meeting, at which, as it turned out, *tableaux vivants* formed one of the items. This subsequently leaked out, and the result is that my programmes and announcements for technical meetings now receive an investigation that would do credit to a Government Inspector. A large number of the members will tear themselves away from the delights of Shepherds Bush at an early hour on Thursday, to embark for a week's visit to Germany, where they will be the guests of the German Association of Gas Managers. And after a few days of visits, lunches, dinners, etc., that call for nothing less than the exceptional energy and digestive powers that must be possessed by Presidents, Monarchs and Mayors, they will get back to London in time to fraternize for a few days with the French Gas Engineers, who have arranged a visit to London at the close of their annual meeting. Those who do not go to Germany will have the alternative of an excursion to Brighton on the Friday. Then there are the usual annual proceedings of allied societies, such as the Institution of Civil Engineers and the Society of Chemical Industry. The last named offer a most attractive programme of excursions to works and factories, including a visit to one of the gas works at Newcastle. The technical programme of this Society, by the way, is most valuable as a means of education to all engaged in any branch of chemical engineering.

Of the papers to be submitted at the Institution meeting, two will deal with the subject of vertical retorts. Mr. Hayman, of Berlin, will describe his experiences with the Dessau vertical retorts, and Mr. H. W. Woodall, of Bournemouth, will take up a wider view of the subject under the heading of "Continuous Distillation in Vertical Retorts." All who are acquainted with Mr. Woodall, or have any knowledge of the thorough, practical and painstaking manner in which he has been working on these lines at Bournemouth for some few years, will anticipate a technical treat. Prof. Bone, of Leeds, will deliver a lecture on the construction and thermal decomposition of hydrocarbons. The object of adjourning to the Franco-British Exhibition for the third day's meeting is to enable the members and their friends to proceed, immediately after the close of business, to inspect the gas section of the Exhibition, where a most interesting and

instructive show is on view. Further details of this must stand over for the present.

The annual report of the Council is much more than a mere formal summary of the proceedings. It extends to considerable length, some 34 pages, and includes over a dozen headings. After the usual account of the proceedings at the last meeting, and the position of the Institution, which now numbers over 800 members, details are given respecting the various matters that have occupied the attention of the Council during the year. These are remarkable for breadth and variety, as they include legal and parliamentary matters, insurance of gas works, encouragement of education, labor questions, scientific investigation and research, electrolysis and accounts. This of itself is a proof of the all-round nature of the qualifications that should be possessed by a modern gas manager, and several of the items will give rise to instructive discussion. As regards insurance, while there can be no question as to the desirability of being covered against all possible risks, the investigations of the Committee appointed last year to consider and report on the insurance of gas works' employees under the Workmen's Compensation Acts, has elicited the fact that the gas companies could insure themselves at much cheaper rates than those granted by insurance companies. Out of 252 returns furnished by members of the Institution, it was found that the average rate of premium was 7s. 6d. per cent., but that the amount returned as claims was less than one-half. It would be well to apply this test to all other classes of insurance. After considerable investigation the Committee point out that a special insurance company might be promoted by persons interested, or that a combination on the mutual principle might be found, and they explain fully the steps that would have to be taken in bringing either of these schemes to a practical issue. The sub-committee on the economical application of gas for warming purposes give full details of their experiments and investigations. These operations are still in progress, but they have already secured some interesting results, the most important of which is that the Referees' sulphur apparatus, which has been recognized for many years as a standard process for estimating sulphur other than sulphuretted hydrogen in coal gas, is not reliable, being subject to "rather large sources of error." Mr. Forshaw, who has been selected as a suitable candidate for the Fellowship in Gaseous Fuel, available at the Leeds University, and worth £100 per annum, is engaged in a promising line of work on the relative "mantle" efficiency of carbonic oxide and hydrogen, which is expected to elucidate many obscure problems relative to incandescent lighting.

The use of peat in admixture with coal, in connection with the ordinary retort house process for the manufacture of coal gas, is the subject of a patent recently granted to Messrs. Hansford and Gibbons. The primary object of the invention is claimed to be the production of a fuel more suitable for domestic and other purposes than gas coke as now generally made, and it therefore belongs to the fairly numerous processes lately introduced with the object of meeting the demand for improved smokeless fuel. The coal to be used in the retort house is mixed with something less than half—say ⅓ to ⅔—its weight of peat, and the mixture is to be broken up without being pulverized, in such a manner that a fairly intimate and even compound of the two constituents is obtained. Any kind of caking coal or slack can be used, but when a yield of illuminating gas of a usual quality is desired a good gas coal would preferably be employed. The actual process of dealing with the fuel does not differ from the usual methods of converting coal into coke, the mixture being charged into the retorts, which may be of the customary temperatures, but the usual experience is that the time required for complete distillation is much less than the usual 5 or 6 hours for coal alone. As much might be expected, seeing that peat is much lighter and more bulky than coal, and therefore a charge of the mixture would weigh appreciably less than an equal bulk of coal. But apart from that, well dried peat gives off gas much more rapidly than ordinary gas coal at the same temperature, and in fact when testing peat alone, the rapidity with which the charge is worked off may cause inconvenience. The questions involved in this case appear to include the intrinsic value of the mixture, as ascertained by comparing its cost with the yield of gas and products; the effect of the larger proportion of water in the liquid products, as concerned with the ultimate strength of ammoniacal liquor in the store well; and the proportion of carbonic acid present in the gas, and its effect on the cost of purification. The expense of mixing large quantities of material such as peat and coal is also appreciable. The process is undergoing practical trial at several gas works, and information on these points will no doubt be forthcoming in due course.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. H. G. PERRING, Secretary of the Engineers' Club, of Philadelphia, informs us that, in order to insure sure and prompt delivery of communications intended for that body, that such communications should be addressed "The Engineers' Club of Philadelphia, 1317 Spruce street, Philadelphia, Pa."

THE Rail-Light Company, of Toledo, O., has suggested to the Board of Public Safety, of Toledo, O., that it be given an opportunity to demonstrate that gas through high power burners will serve at least as well as electricity for the purpose of illuminating the alleys in the lower section of that city. This suggestion is prompted by the fact that, in accordance with the city ordinance ordering the removal of all poles from the city's streets, such removal will practically cause the lighting of such alleys with arc electric lamps to become impossible.

A DRASTIC sample of "trust busting" laws and their enforcement would seem to be shown in the following inclosure from New Orleans, La., under date of the 20th inst.: "Last Wednesday, at Natchez, Miss., acting under a decree of the Chancery Court of Adams county, handed down by Chancellor Hicks, W. O. Pollock, as Trustee, sold the local property and holdings of the Southern Light and Traction Company, which consist of an electric street railway and gas and electric plants. The purchaser was Mr. L. H. Dinkins, President of the Company and President of the Interstate Trust and Banking Company, of New Orleans, at his bid of $5,000 over and above all liabilities of the Company. The property is on the municipal assessment rolls for $125,000, which is regarded as a 50 per cent. valuation. The Company was adjudged a trust, and ordered to be dissolved, a writ of ouster having been issued to that end. The local plants (Natchez) are included in the holdings of the Southern Electric Securities Company, with plants at Vicksburg, Natchez, Jennings, La., and Beaumont, Tex. The sale remains to be confirmed by the Chancellor. Meanwhile the present officials hold over until such confirmation is announced."

THE reorganization of the Consumers Gas and Fuel Company, of Atlantic City, N. J., has been completed. The executives in control are: President, Louis Kuenhle; Vice-President, Frederick Treat; Chairman of Board of Directors, Clarence P. King; Treasurer, F. B. Aldrich; Secretary, Joseph McNamee. The new Board of Directors contains the names of several gentlemen well and favorably known in the banking and other business interests in Washington and Mount Vernon, D. C., Philadelphia, Cumberland, Md., and Williamsport, Pa. Under the present management it goes beyond a doubt that any contracts entered into by or for the Company will be faithfully carried out.

SIOUX CITY, IA., under its new contract for the public lighting of that place (it is to run for 10 years, or until 1918), has done away with the moontable schedule of lighting, much to the satisfaction of General Manager Kellogg and his associates, who have been stoutly contending for such readjustment for at least 15 years.

THE gas plant for Brandon, Manitoba, the franchise for which is controlled by the International Heating and Lighting Company, of Cleveland, O., will be constructed forthwith.

"HERE'S the best of good luck to them," which good, old-time wish is written to the embarkation of Mr. George Williams, one of the leading lieutenants on the engineering staff of Messrs. Henry L. Doherty & Co. Perhaps two or three years ago, Miss Christina Dahl, niece of one of Norway's greatest admirals of the time, was sent to New York to complete her knowledge of the English language. The second week this month she graduated with her Class, and on the 19th she was to have sailed for her home in Christiana; but she didn't. On the contrary, she went by rail to prosy, busy Scranton, Pa., and there the glory began. About six months ago Miss Dahl was introduced to Mr. Williams. Now, those who know that energetic chap need not be told that grass grows not under his feet, and in wooing as in working, the gentleman suffers not from inaction. To cut it short, however, he proposed, was accepted and the day was set. The knot was tied in Scranton the 15th inst., and the wedding trip was in, around and about the St. Lawrence and its dependencies. Quite likely, somewhat later on, Mr. and Mrs. Williams will sail for Nor-

way, there to receive a royal salute. Again, "the best of good wishes to them.—O."

A VICIOUS looking ordinance, concerning the inspection of gas mains and rating them for taxation on the basis of $30 per mile per annum, is on the order of its passage by the Steelton (Pa.) City Council.

WE are regretfully obliged to chronicle the death of Mr. Edmund S. Grander, for several years Superintendent of the Consolidated Schuylkill (Pa.) Gas Company, who died at his home in Royersford the morning of the 13th inst. Deceased, who had been prominent in the affairs of Phœnixville and Royersford for several years, was born April 9th, 1867, and was well and favorably known in the business, political and social life of the Schuylkill Valley. He was Postmaster of Royersford for 6 years and was superintendent of the affairs of the Schuylkill Consolidated Gas Company for a much longer period. In fact, his connection with the Company was maintained up to last March, when physical inability, brought about by a long siege of illness, obliged him to resign. His widow, two daughters and three sons survive him. The funeral services were held in the First Baptist Church, and interment was made in Fernwood Cemetery. For facts in connection with this obituary note we are indebted to the courtesy of Mr. John H. Mansur.

SUPERINTENDENT JENKS, of the Lyons (N. Y.) Gas Light Company, will retire from the service of the Company on July 30th, having accepted the position of Superintendent of the South Station of the Providence (R. I.) Gas Company.

THE plant of the Dauphin County Gas Company, of Harrisburg, Pa., which was taken over some time ago by the Harrisburg Company proper, has been closed down, save for the storage section thereof.

MR. W. H. SNOW, Manager of the municipally conducted gas and electric plants at Holyoke, Mass., declares that the amount purloined in the course of a year in that city from prepayment meters does not exceed in value that which would have to be charged off in the same period from uncollectable debts.

MR. EZRA NORMAN and associates have been granted a franchise for the construction and operation of a gas plant in Bremerton, Wash. They agree to charge not in excess of $1.35 per 1,000, and to have the plant in operation by July 1, 1909.

MR. CHARLES G. GOELTZ, formerly Superintendent of Station B, Laclede Gas Light Company, St. Louis, Mo., has been appointed Superintendent of the Home Gas Company, Salisbury, Md. Mr. Cyrus Stewart, heretofore Superintendent of the Media (Pa.) branch of the Suburban Gas Company, Chester, Pa., has been appointed Superintendent of the Lititz, Manheim and Ephrata Company, of Lititz, Pa. The consulting engineer to these properties is Mr. J. D. Shattuck.

THE Improved Equipment Company, of New York, is installing in the Seventh street plant of the Pueblo (Cal.) Gas Company, a good working example of its improved coal gas generating apparatus.

AT the annual meeting of the Ottawa (Ills.) Gas Light and Coke Company, the officers chosen were: Directors, C. E. Hook, A. F. Schoch, V. J. Dunham, J. F. Flanagan and P. C. Allen; President, John F. Flanagan; Treasurer-Secretary, P. C. Allen. The President and Treasurer are widely known in the gas business from their Wilkes-Barre, Pa., financial connections.

THE Cumberland, R. I., Town Council has granted an extension of time (to July 1, 1909) to the Pawtucket (R. I.) Gas Company for completing the laying on of a gas service in Cumberland.

BY-THE-WAY, Capt. Macgregor, of the Pawtucket Company, now that Mr. Easton has settled all those consolidation difficulties, is considering a trip to Europe. We believe it would do him good, and likely prevent, for a time at least, any further increase in his girth.

THE new holder for the Petersburg (Va.) Gas Company is rated to store 250,000 cubic feet.

THE new holder for the Lincoln (Neb.) Gas and Electric Company is to rest in a concrete tank, 60 per cent. out of ground.

CITY ATTORNEY LYON does not seem over anxious to set a date when he will emit his opinion respecting the injunction prayed for by the Key City Gas Company, of Dubuque, Ia., to restrain the local authorities from enforcing the 90-cent gas rate ordinance recently put on the statute books by the Dubuque City Council.

ON Wednesday the following electric current rate schedule will become operative in the district supplied by the Clarksburg (Va.) Gas and Electric Company:

Quantity, K.W.				Rate per K.W.
From	0	to	200	.05
"	200	to	500	.04
"	500	to	1,000	.03
"	1,000	to	5,000	.02
All over	5,000			.01½

It is also stipulated that the minimum charge per month for each meter set will be $1.

AT the annual meeting of the Claremont (N. H.) Gas Light Company the officers elected were: Chairman, John M. Whipple; Clerk, Herbert B. Webb; Treasurer, George A. Tenney; Directors, Seth M. Richards, Ira G. Colby, John M. Whipple, George A. Tenney, George H. Stowell and F. P. Maynard.

MESSRS. MASON & LEWIS, of Chicago, who are the largest bondholders, by ownership and representation, of the Elwood (Ind.) Light and Power Company, which is now in the hands of a receiver, are arrranging for the construction of an artificial plant. The place will easily maintain and sustain such an undertaking.

THE Electric and Water Company, of Grand Rapids, Wis., is seriously considering the erection this summer of a gas plant. Write to J. A. Gay, Grand Rapids, Wis., for particulars.

AN important decision respecting active life of corporate creations of the State of New Jersey was made known last week when the Court of Errors handed down an opinion in the appeal of the Vineland Light, Heat and Power Company from a decree in Chancery restraining it from opening streets in Vineland and the township of Landis, Cumberland county, N. J. The Vineland Gas Light Company became insolvent in 1884, and was purchased at receiver's sale by Mr. John R. Farnum, of Waltham, Mass., who operated the plant until March 27, 1890, when he sold it to Mr. Arthur A. Holbrook, who on the 31st of the same month conveyed it to the existing Company. The primal corporation had been given the right to lay pipes in the streets of Vineland and Landis township, but when the present Company sought to lay pipes without the consent of the city and township, these proceedings were instituted. The opinion declares that all the rights, powers and privileges of the original Company passed to the purchaser at the receiver's sale, but his failure to organize under the act of 1881 made necessary the acquirement of new privileges by the Company now owning the plant.

A CORRESPONDENT in Hancock, Mich., writing under date of the 24th inst., incloses the following: "On the evening of the 19th inst. a joint meeting of the Councils of Red Jacket and Laurium was held for the purpose of discussing the proposition introduced some time ago to permit an increase in net gas rates by the Calumet Gas Company of 17 cents per 1,000 cubic feet, from the present figure of $1.08. The Company had petitioned Councils to that effect, and Councils had named as such committee Messrs. Roehm, Ruppe, Ulseth and O'Brien, to investigate and report on the matter. The committee at the meeting above noted unanimously reported to Councils that at the current rate the Company could not keep up its plant and return any dividend to its shareholders, and intimated that, under the conditions existing, it would seem the part of wisdom and of fairness to allow the increase. The discussion was quite informal and the report was returned to Councils, as each body (that of Red Jacket and of Laurium) will have to determine separately for its district.

JUDGE LASSING, writing the opinion of the Court of Appeals, State of Kentucky, in the suit of the Louisville Gas Company against the Kentucky Heating Company, of Louisville, for the retrial of a decision of the lower court, under which the Kentucky Heating Company secured an award of damages against the Louisville Gas Company in the sum of $60,000 for waste of natural gas in the district of the former, ordered a retrial of the case.

MISS IRA G. RICHMOND, a woman of perhaps 25 years of age, was recently appointed General Manager of the works and office of the Magherafelt (Ireland) Gas Company.

THE damage suit brought against the Denver (Col.) Gas and Electric Company by the insurance companies concerned in the losses made through policies covering the property of the Denver Twenty-third Avenue Presbyterian Church, resulted in a mistrial. The trial was based on the allegation that, as the fire was the result of an escape of electrical current from the wires of the defendant, such wires having been faultily placed and maintained, such defendant was liable to the insurers for their losses.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

MONDAY, JUNE 29, 1908.

The Market for Gas Securities.

The weakness in the general share market was well reflected by the trading in Consolidated, which, on very small volume of trading, sold down to 122½. The opening figures to-day (Friday) were 122½ to 123. No transactions at all were done in it yesterday.

Brooklyn Union is 112 to 120, and there is an undeniably strong look about the slight actual transactions reported in it. Peoples, of Chicago, is as it was a week ago. A feature of this first summer month is the regularity with which dividends on gas shares all over the country are being declared.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks

16 WALL STREET, NEW YORK CITY.

JUNE 29.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid*	*Asked.*
Consolidated	$73,177,000	100	122½	123
Central Union Gas Co.—				
1st 5's, due 1978, J. & J.	3,000,000	1,000	92	97
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual	3,500,000	100	130	140
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	92	96
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98	104
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	100	105
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1947, J. & J.	1,250,000	1,000	90	98
Standard	5,000,000	100	70	100
Preferred	5,000,000	100	100	125
1st Mtg. 5's, due 1990, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	112	120
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91½	92
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	1	1 1-16
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
" " Bonds, 5's	a250,000	1,000	63	66
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	105¼
Cincinnati Gas and Electric Co.	29,500,000	100	86½	89
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	92	98
Columbus (O.) Gas Lt. & Heating Co.	1,822,750	100	87	88
Preferred	3,028,500	100	81	82
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	104
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,400,000	—	—	119
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	—	—	74½	75
Detroit City Gas Co.	6,000,000	50	—	50
" Prior Lien 5's	4,618,000	1,000	—	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	30	40
ort Wayne	2,000,000	—	—	—
" Bonds	3,000,000	—	55	—
Grand Rapids Gas Lt. Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	100	105
" Bonds, 5's	10,500,000	—	101	102½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	10	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	—	104
Preferred	2,500,000	100	60	10
Bonds	10,000,000	1,000	104	104½
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,470,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	84	—
Preferred	25,000,000	100	84	—
Montreal, Canada	2,000,000	100	215	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	91¼	92
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Elec. Co.	2,150,000	50	88	—
Preferred	2,150,000	50	116	—
Consolidated 5's	2,000,000	—	104½	103½
San Francisco, Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	92	—
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	114
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90½	—
Syracuse, N. Y.	1,378,000	100	50	55
Bonds	2,047,000	1,000	102	—
Washington, D. C.	2,400,000	20	310	330
1st Mortgage, 6's	600,000	—	—	—
Western, Milwaukee	4,000,000	—	—	—
Wilmington, Del.	600,000	50	230	—

Advertisers' Index.

GAS ENGINEERS. Page

Cruse-Kemper Co., Philadelphia, Pa. 1134
Davis & Farnum Mfg. Co., Waltham, Mass. 1136
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1135
Frank D. Moses, Trenton, N. J. 1134
Frederic Egner, Norfolk, Va. 1140
Frederick J. Mayer, New York City. 1121
H. M. Byllesby & Co., Chicago, Ills. 1136
Humphreys & Glasgow, New York City. 1136
Isbell-Porter Co., Newark, N. J. 1124
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1137
The Gas Machinery Co., Cleveland, O. 1120
The Jeffrey Manufacturing Co., Columbus, O. 1134
United Gas Improvement Co., Philadelphia, Pa. 1131
Western Gas Construction Co. Fort Wayne, Ind. 1100

GAS WORKS APPARATUS AND CONSTRUCTION.

Connelly Iron Sponge & Governor Co., New York City. 1138
Continental Iron Works, Brooklyn, N. Y. 1138
Cruse-Kemper Co., Philadelphia, Pa. 1134
Davis & Farnum Mfg. Co., Waltham, Mass. 1136
Delly & Fowler, Philadelphia, Pa. 1130
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1135
Frank D. Moses, Trenton, N. J. 1138
Humphreys & Glasgow, New York City. 1136
Isbell-Porter Co., New York City. 1124
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1137
Lloyd Construction Co., Detroit, Mich. 1148
Logan Iron Works, Brooklyn, N. Y. 1140
Quintard Iron Works, New York City. 1145
R. D. Wood & Co., Philadelphia, Pa. 1138
Riter-Conley Mfg. Co., Pittsburgh, Pa. 1123
Stacey Mfg. Co., Cincinnati, O. 1139
The Gas Machinery Co., Cleveland, O. 1120
The Jeffrey Manufacturing Co, Columbus O. 1134
United Gas Improvement Co., Philadelphia, Pa. 1131
Western Gas Construction Co., Fort Wayne, Ind. 1100

PROCESSES.

Bartlett, Hayward & Co., Baltimore, Md. 1137
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1135
Humphreys & Glasgow, New York City. 1136
Semet-Solvay Co., Syracuse, N. Y. 1134
The Gas Machinery Co., Cleveland, O. 1120
United Gas Improvement Co., Philadelphia, Pa. 1131
Western Gas Construction Co., Fort Wayne, Ind. 1100

SCRUBBERS AND CONDENSERS.

Continental Iron Works, Brooklyn, N. Y. 1138
Cruse-Kemper Co., Philadelphia, Pa. 1134
Davis & Farnum Mfg. Co., Waltham, Mass. 1136
Economical Gas Apparatus Construc. Co. Toronto, Ont. 1135
Isbell-Porter Co., Newark, N. J. 1124
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1137
Logan Iron Works, Brooklyn, N. Y. 1140
R. D. Wood & Co., Philadelphia, Pa. 1138
Riter-Conley Mfg. Co., Pittsburgh, Pa. 1123
Stacey Mfg. Co., Cincinnati, O. 1139
The Gas Machinery Co., Cleveland, O. 1120
Western Gas Construction Co., Fort Wayne, Ind. 1100

PRODUCER POWER PLANTS.

Economical Gas Apparatus Construc. Co., Toronto, Ont. 1135
R. D. Wood & Co., Philadelphia, Pa. 1138

TAR AND CARBONIC ACID EXTRACTOR.

Economical Gas Apparatus Construc. Co., Toronto, Ont. 1135
Isbell-Porter Co., Newark, N. J. 1124
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1137
Stacey Mfg. Co., Cincinnati, O. 1139
The Gas Machinery Co., Cleveland, O. 1120
Western Gas Construction Co., Fort Wayne, Ind. 1100

AMMONIA CONCENTRATORS.

Michigan Ammonia Works, Detroit, Mich. 1107
The Gas Machinery Co., Cleveland, O. 1120
Western Gas Construction Co., Fort Wayne, Ind. 1100

GAS METERS.

American Meter Co., New York and Philadelphia. 1143
Detroit Meter Company, Detroit, Mich. 1099
D. McDonald & Co., Albany, N. Y. 1141
Helme & McIlhenny, Philadelphia, Pa. 1143
John J. Griffin & Co., Philadelphia, Pa. 1144
Keystone Meter Co., Royersford, Pa. 1142
Maryland Meter and Mfg. Co., Baltimore, Md. 1142
Metric Metal Co., Erie, Pa. 1143
Nathaniel Tufts Meter Co., Boston, Mass. 1142
New York Improved Meter Co., New York City. 1142
Pittsburg Meter Co., East Pittsburg, Pa. 1141
Rotary Meter Co., New York City. 1119
Sprague Meter Co, Bridgeport, Conn. 1118
United States Meter Co, Brooklyn, N. Y. 1118

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia. 1143
D. McDonald & Co., Albany, N. Y. 1141
Helme & McIlhenny, Philadelphia, Pa. 1143
John J. Griffin & Co., Philadelphia, Pa. 1144
Keystone Meter Co., Royersford, Pa. 1142
Nathaniel Tufts Meter Co., Boston, Mass. 1142
New York Improved Meter Co., New York City. 1141
Pittsburg Meter Co., East Pittsburg, Pa. 1141
Sprague Meter Co., Bridgeport, Conn. 1118

PREPAYMENT METER ATTACHMENTS.

New York Improved Meter Co., New York City. 1142

WATER METERS.

Pittsburg Meter Co., East Pittsburg, Pa. 1141

GAS AND WATER PIPES.

Davis & Farnum Mfg. Co., Waltham, Mass. 1136
Donaldson Iron Co., Emaus, Pa. 1148
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1135
R. D. Wood & Co., Philadelphia, Pa. 1138

GAS COALS.

Berwind-White Coal Mining Co., New York and Phila. 1134
Perkins Co., New York City. 1134
Westmoreland Gas Coal Co., Philadelphia, Pa. 1135

GAS MAIN STOPPERS.

Edward A. Behringer, New York City. 1138
Safety Gas Main Stopper Co., New York City. 1148 1135

MAIN AND SERVICE LAYING.

Sullivan Bros., Flushing, N. Y. 1135

GAS TAPPING MACHINES.

George Light, Dayton, O. 1135
H. Mueller Manufacturing Co., Decatur, Ills. 1126

CANNEL COALS.

Perkins & Co., New York City. 1134

STOKING MACHINERY.

G. A. Bronder, New York City. 1133

CONVEYORS—ALL KINDS.

Brown Hoisting Machinery Co., Cleveland, O. 1126
Cruse-Kemper Co., Philadelphia, Pa. 1134
C. W. Hunt Company, New York City. 1126
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1135
G. A. Bronder, New York City. 1133
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1137
The Gas Machinery Co., Cleveland, O. 1120
The Jeffrey Manufacturing Co., Columbus, O. 1134
Western Gas Construction Co., Fort Wayne, Ind. 1100

CHARGING BARROWS & COAL WAGONS.

Davis & Farnum Mfg. Co., Waltham, Mass.....1136
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1137
Stacey Mfg. Co., Cincinnati, O.....1139

GAS ENRICHERS.

Standard Oil Co., New York City.....1091

COKE CRUSHERS.

C. M. Keller, Columbus, Ind.....1135
The Jeffrey Manufacturing Co., Columbus, O.....1134

GAS METER CONNECTIONS.

H. Mueller Manufacturing Co., Decatur, Ills.....1126

GAS COCKS.

H. Mueller Manufacturing Co., Decatur, Ills.....1126

GAS GAUGES.

The Bristol Co., Waterbury, Conn.....1128

GAS GOVERNORS.

Chaplin-Fulton Mfg. Co., Pittsburg, Pa.....1139
Connelly Iron Sponge & Governor Co., New York City 1134
Isbell-Porter Co., Newark, N. J.....1124
Pittsburg Meter Co., East Pittsburg, Pa.....1141
R. D. Wood & Co., Philadelphia, Pa.....1138
Reynolds Gas Regulator Co., Anderson, Ind.....1138

CEMENTS.

C. L. Gerould, Pittsburgh, Pa.....1138

RETORTS AND FIREBRICKS.

Baltimore Retort and Firebrick Co., Baltimore, Md...1132
Didier-March Co., New York City.....1121
Gas Bench Construction Co., St. Louis, Mo.....1134
Henry Maurer & Son, New York City.....1125
Improved Equipment Company, New York City.....1132
James Gardner, Jr., Co., Bolivar, Pa.....1124
J. H. Gautier & Co., Jersey City, N. J.....1132
Laclede-Christy Clay Products Co., St. Louis, Mo.....1125
Missouri Firebrick Co., St. Louis, Mo.....1132
Parker-Russell Mining and Mfg. Co., St. Louis, Mo....1128

INCLINED RETORTS.

Baltimore Retort and Firebrick Co., Baltimore, Md...1132
Didier-March Co., New York City.....1121
Gas Bench Construction Co., St. Louis, Mo.....1132
Laclede-Christy Clay Products Co., St. Louis, Mo.....1125
Parker-Russell Mining and Mfg. Co., St. Louis, Mo...1128

VERTICAL S'S.

Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System)1133
Didier-March Co., New York City.....1121
Gas Bench Construction Co., St. Louis, Mo.....1132
Laclede-Christy Clay Products Co., St. Louis, Mo 1125
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. . 1128

REGENERATIVE FURNACES.

Baltimore Retort and Firebrick Co., Baltimore, Md..1132
Bartlett, Hayward & Co., Baltimore, Md.....1137
Didier-March Co., New York City.....1121
Gas Bench Construction Co., St. Louis, Mo.....1134
J. H. Gautier & Co., Jersey City, N. J.....1132
Laclede-Christy Clay Products Co., St. Louis, Mo.....1125
Missouri Firebrick Co., St. Louis, Mo.....1134
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.. 1128

SELF-SEALING MOUTHPIECE DOORS.

Continental Iron Works, Brooklyn, N. Y.....1138
Davis & Farnum Mfg. Co., Waltham, Mass.....1136
Isbell-Porter Co., Newark, N. J.....1124
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1137
Logan Iron Works, Brooklyn, N. Y.....1140
R. D. Wood & Co., Philadelphia, Pa.....1138
Stacey Mfg. Co., Cincinnati, O.....1139
The Gas Machinery Co., Cleveland, O.....1120
Western Gas Construction Co., Fort Wayne, Ind.....1100

INCANDESCENT GAS LAMPS.

General Gas Light Co., Kalamazoo, Mich.....1127
Welsbach Company, Gloucester, N. J.....1130

BURNERS.

Wm. M. Crane Co., New York City.....1128

STREET LAMPS.

Thos. T. W. Miner, New York City.....1136
Welsbach Street Lighting Co., New York and Phila..1130

DRILLS—ROCK AND STONE.

The Jeffrey Manufacturing Co., Columbus, O.....1134

PULVERIZERS.

The Jeffrey Manufacturing Co., Columbus, O.....1134

PURIFIERS.

Connelly Iron Sponge & Governor Co., New York City.1133
Cruse-Kemper Co., Philadelphia, Pa.....1124
Davis & Farnum Mfg. Co., Waltham, Mass.....1136
Isbell-Porter Co., Newark, N. J.....1124
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1137
R. D. Wood & Co., Philadelphia, Pa.....1138
Stacey Mfg. Co., Cincinnati, O.....1139
Western Gas Construction Co., Fort Wayne, Ind.....1100

PURIFYING MATERIALS.

Connelly Iron Sponge & Governor Co., New York City1133
Western Oxide and Specialty Co., Chicago, Ills.....1139

VALVES.

Continental Iron Works, Brookln, N. Y.....1138
Davis & Farnum Mfg. Co., Waltham, Mass.....1136
Economical Gas Apparatus Construc. Co., Toronto, Ont.1135
Isbell-Porter Co., Newark, N. J.....1124
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1137
Ludlow Valve Manufacturing Co., Troy, N. Y.....1125
R. D. Wood & Co., Philadelphia, Pa.....1138
Stacey Mfg. Co., Cincinnati, O.....1139
The Gas Machinery Co., Cleveland, O.....1120
The P. H. & F. M. Roots Co., Connersville, Ind.....1127
Western Gas Construction Co., Fort Wayne, Ind.....1100

EXHAUSTERS.

Connelly Iron Sponge & Governor Co., New York City1133
Connersville Blower Company, Connersville, Ind.....1122
Davis & Farnum Mfg. Co., Waltham, Mass.....1136
Isbell-Porter Company, Newark, N. J.....1124
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1137
Piqua Blower Co., Piqua, O.....1125
The P. H. & F. M. Roots Co., Connersville, Ind.....1127

PURIFIER AND SCRUBBER TRAYS.

Cabot Mfg. Co., Hoboken, N. J.....1135
Western Gas Construction Co., Fort Wayne, Ind.....1100

GAS STOVES.

American Meter Co., New York and Philadelphia.....1141
Keystone Meter Co., Royersford, Pa.....1143
Maryland Meter & Manufacturing Co., Baltimore, Md...1142
Nathaniel Tufts Meter Co., Boston, Mass.....1142

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich.....1126

GASHOLDERS.

Bartlett, Hayward & Co., Baltimore, Md.....1137
Continental Iron Works, Brooklyn, N. Y.....1138
Cruse-Kemper Co., Philadelphia, Pa.....1124
Davis & Farnum Mfg. Co., Waltham, Mass.....1136
Deily & Fowler, Philadelphia, Pa.....1140
Economical Gas Apparatus Construc. Co., Toronto, Ont.1135
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1137
Logan Iron Works, Brooklyn, N. Y.....1140
R. D. Wood & Co., Philadelphia, Pa.....1138
Riter-Conley Mfg. Co., Pittsburgh, Pa.....1123
Stacey Mfg. Co., Cincinnati, O.....1139
Western Gas Construction Co., Fort Wayne, Ind.....1100

STORAGE TANKS.

Davis & Farnum Mfg. Co., Waltham, Mass.....1136
Stacey Mfg. Co., Cincinnati, O.....1139
Western Gas Construction Co., Fort Wayne, Ind.....1100

PATENTS, TRADE-MARKS, COPYRIGHTS.

Royal E. Burnham, Washington, D. C.....1139

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., June 10, 1908.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable July 15th, 1908, to stockholders of record at the close of business, June 30, 1908. Checks will be mailed.

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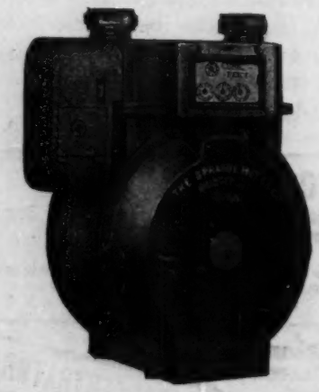

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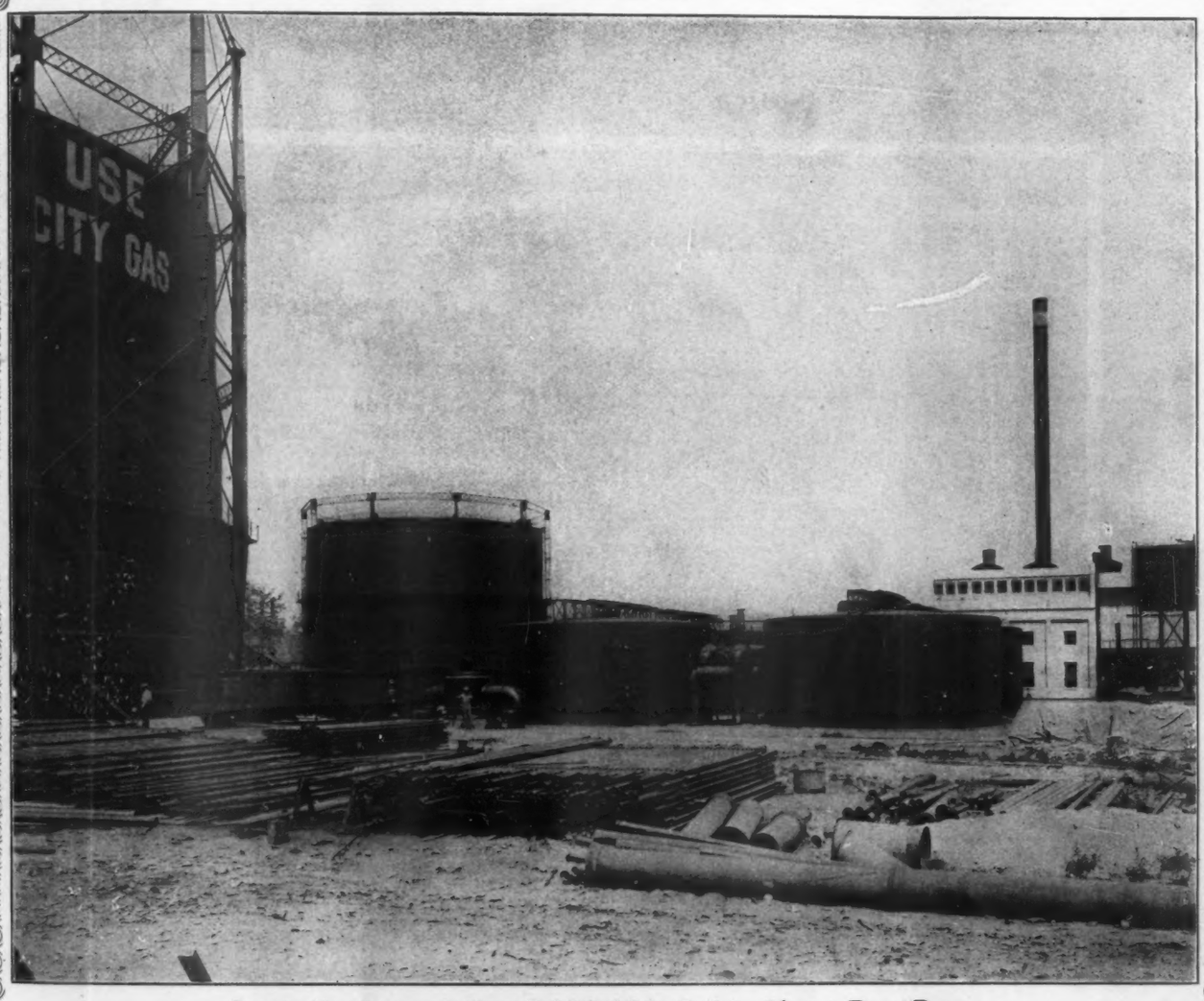

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We have Recently Contracted with the ILLINOIS STEEL COMPANY (United States Steel Corporation) for the delivery of

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Each Having a Capacity of **3,840,000 Cubic Feet per Day.**

These Machines will be Installed at Joliet, Illinois, to Measure Product of Coke Ovens Now Under Construction by that Company.

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One-half the cost—One-tenth the space of old style wet meters.

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EXHAUSTERS, CONDENSERS, SCRUBBERS,
TAR EXTRACTORS, WASHERS, PURIFIERS,
VALVES, CONNECTIONS,
BY PRODUCT MACHINERY,
COMPLETE GAS PLANTS.

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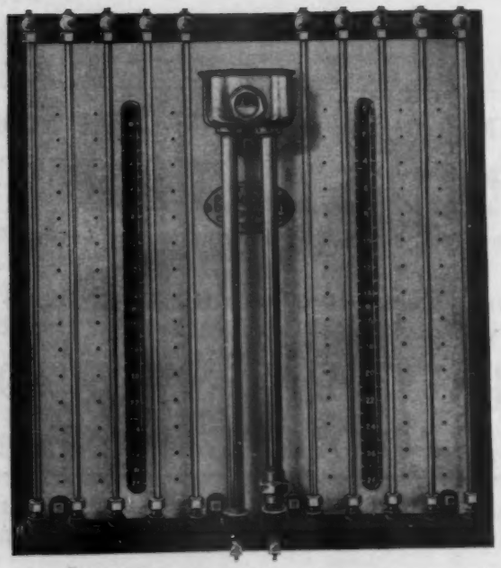

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THE GAS MACHINERY CO.
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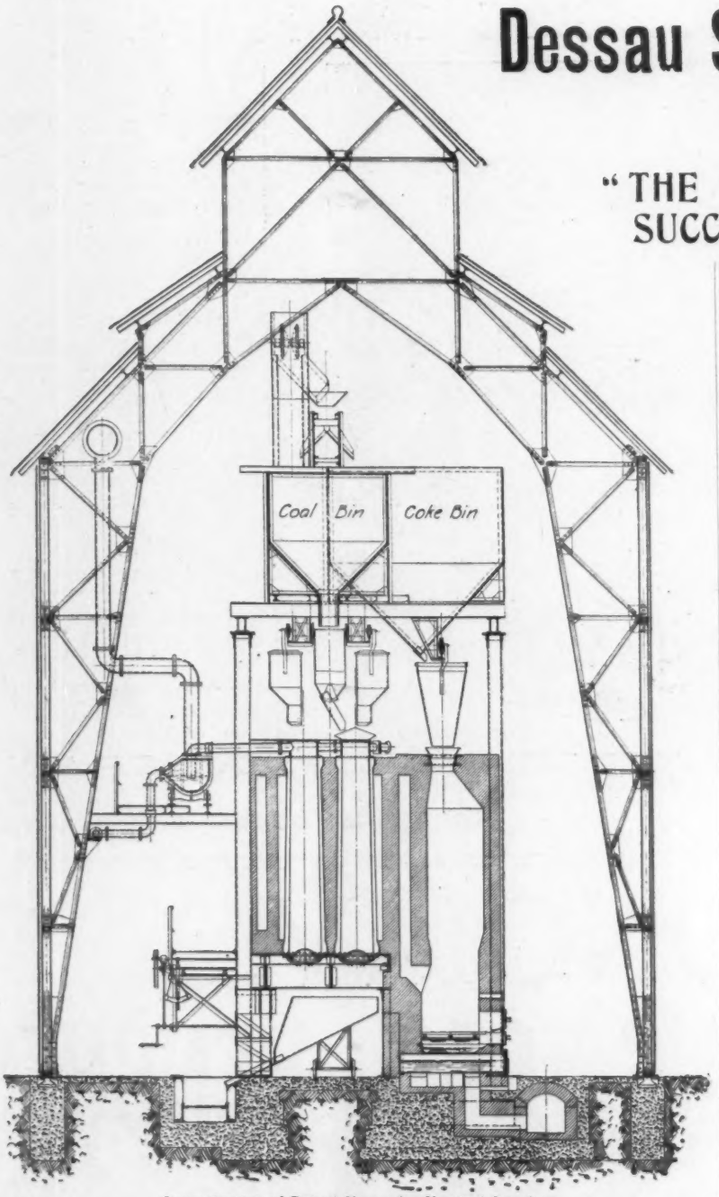
Dessau System of Vertical Retorts.

"THE ONLY SYSTEM IN SUCCESSFUL OPERATION."



Cross Section of Retort House for Vertical Benches.

- Nineteen Installations with 126 Benches in operation.
- **ELEVEN** Installations with **96** Benches in course of construction.
- Maximum gas produced per man per 24 hours, 360,000 cu. ft.
- Ten per cent. increase in yield of gas.
- Forty per cent. increase in yield of ammonia.
- Best quality of coke.
- Least percentage of breeze.
- Low fuel consumption.
- Tar produced low in carbon.
- Extreme low cost of retort house labor.
- Minimum expense in wear and tear.
- No Naphthaline.
- No Cyanogen.

Present Producing Capacity, 25 Million Cu. Ft.

Within **90 days** the above producing capacity has been increased to **31 Million Cubic Feet** by additional orders for **39 benches** with **390 retorts.**

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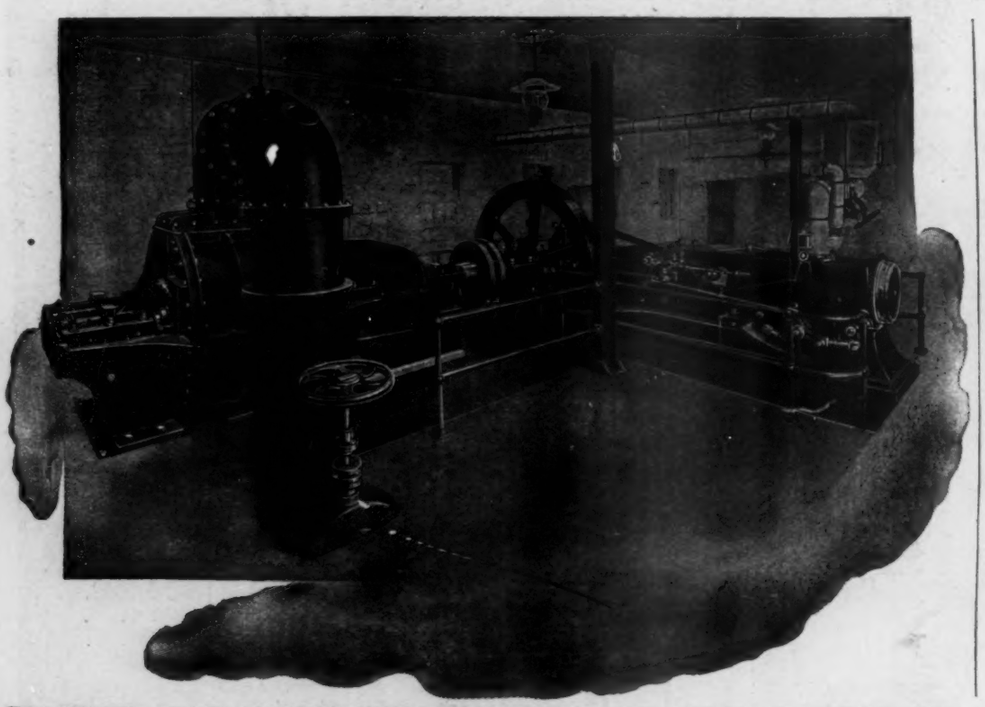
AND HIGH PRESSURE GAS PUMPS.



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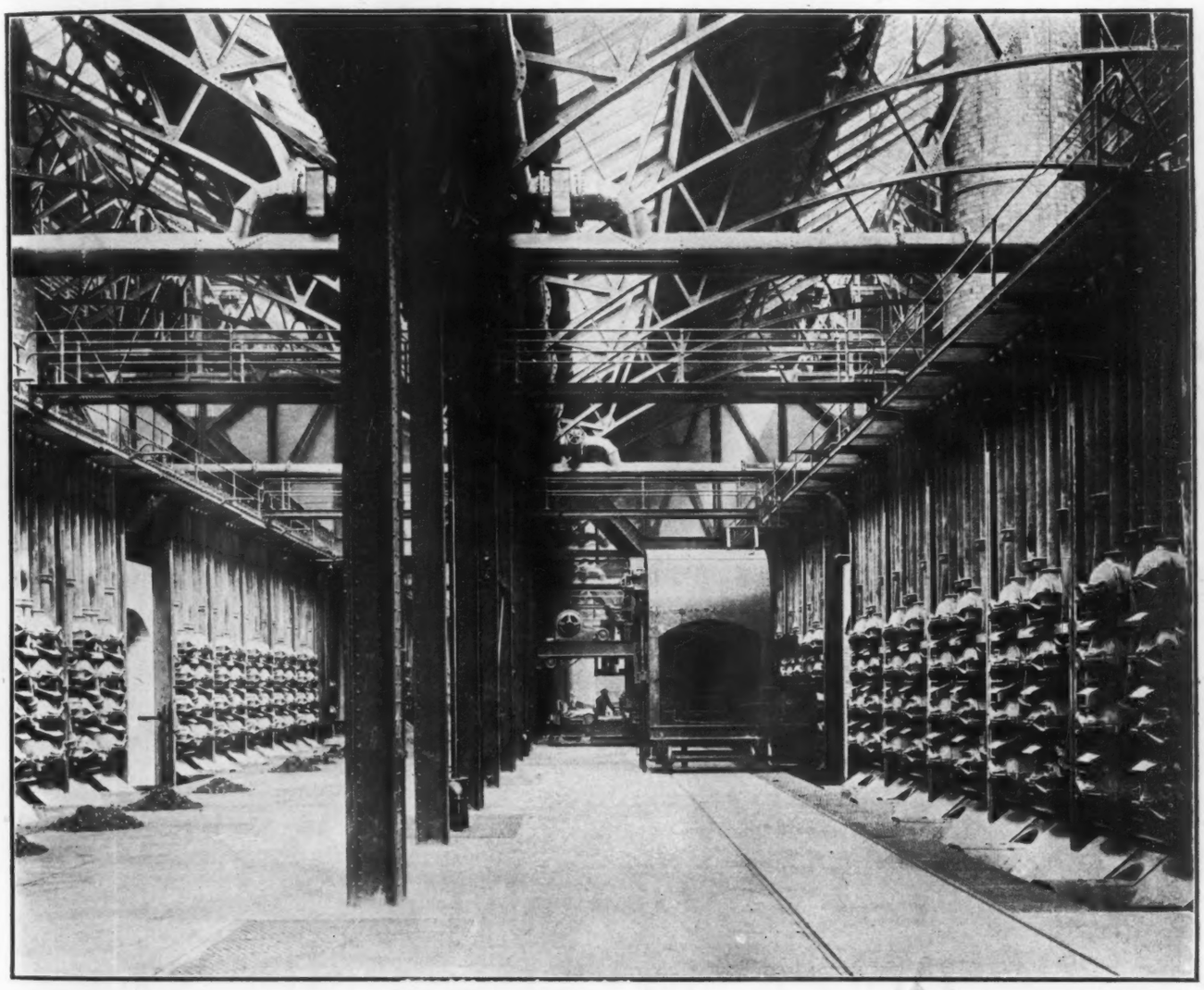

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MACKENZIE EXHAUSTERS
PRIMARY AND SECONDARY. CONDENSERS FOR FRESH OR SALT WATER

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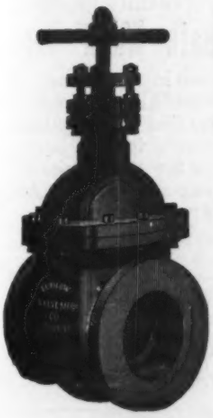

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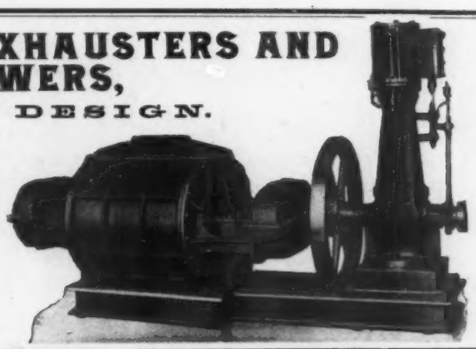

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Should be used in every home. They make Hot Water **always** ready. Require no attention after installation. Hot water pours forth at any time upon lighting the gas. Close off the gas and all expense ceases. **Absolutely Guaranteed.**

Special Merits.

A burner that won't light back; a rust proof enameled shelf; a removable base plate for ready access to burner.

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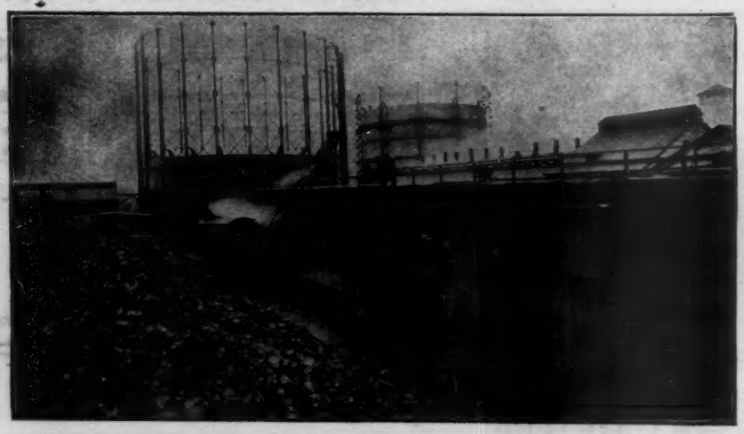

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THE BROWN HOISTING MACHINERY COMPANY,

Designers and Builders of All Kinds of Hoisting Machinery.

Main Office and Works:
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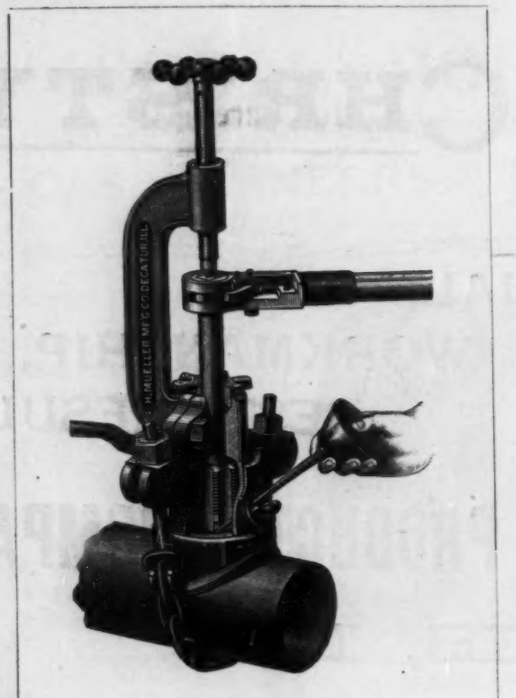

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Of tapping gas mains when you operate with a Mueller Gas Main Tapping Machine.

And you have an easy way of knowing how serviceable and satisfactory these machines are by simply asking anyone who has used them.

It's an easy proposition all around.

The ratchet handle of the Mueller machine has a wide sweep, which makes it easy to work from any position, and the body goose neck, being adjustable, can be kept out of the way all of the time. Unconditionally Guaranteed.

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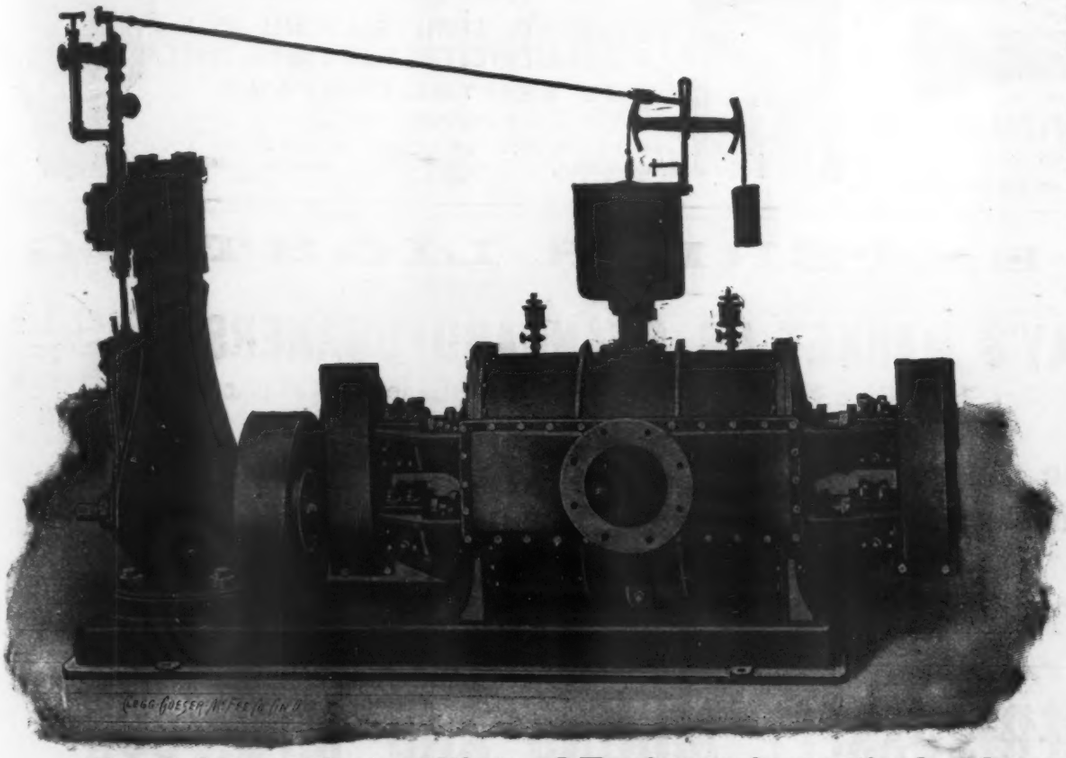

Sizes for any required capacity.

Self-oiling, adjustable bronze bearings.

Most perfect and sensitive Governor.

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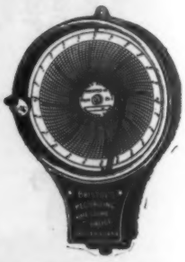

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— USE —

BRAY'S MARKET OR STANDARD BURNERS.

Bray's Special Burner.

For Markets, Meat Shops, Fruit Stands, Show Windows, Street Lamps, and all places where high candle power is required.

These Burners Give a Large, Well-Shaped Flame.

They are Very Durable and Can be Depended Upon to Give Satisfactory Service for Years.

Market burners can be furnished in Nos. 8 and 9. The Jumbo burner is 30-candle power size.

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We Manufacture Gas Retorts and Settings, Furnace Blocks and Fire Clay Tiles of Every Description.

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Retort Houses and Conveying Machinery.--We also build Retort Houses, Coal and Coke Conveying Machinery. Plans, specifications and estimates cheerfully furnished.

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Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

JULY, 1908.

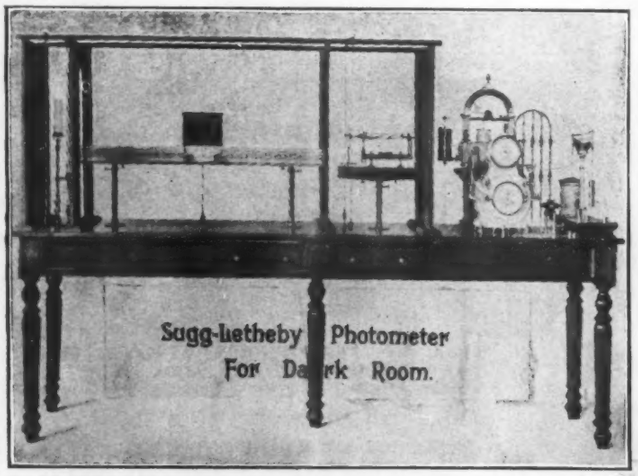
Table No. 1.
FOLLOWING THE MOON.

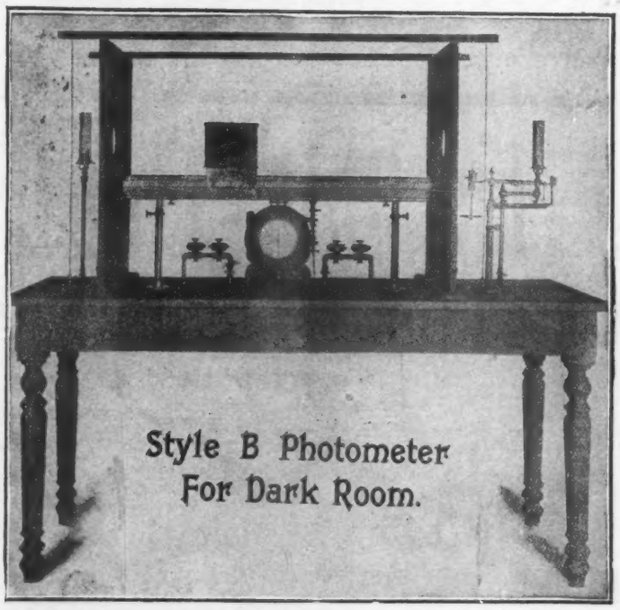
Day of Week.	Date.	Light.	Extinguish.
Wed.	1	8.00 PM	3.30 AM
Thu.	2	8.00	3.30
Fri.	3	9.50	3.30
Sat.	4	10.20	3.30
Sun.	5	10.40	3.40
Mon.	6	11.10 FQ	3.40
Tue.	7	11 40	3.40
Wed.	8	12.10 AM	3.40
Thu.	9	12.40	3.40
Fri.	10	1.20	3.40
Sat.	11	2.10	3.40
Sun.	12	No L.	No L.
Mon.	13	No L PM	No L.
Tue.	14	No L.	No L.
Wed.	15	8.00 PM	10.20 PM
Thu.	16	8.00	10.50
Fri.	17	8.00	11.30
Sat.	18	8.00	12.00
Sun.	19	7.50	12.30 AM
Mon.	20	7.50 LQ	1.00
Tue.	21	7.50	1.30
Wed.	22	7.50	2.00
Thu.	23	7 50	2 40
Fri.	24	7.50	3.50
Sat.	25	7.50	3.50
Sun.	26	7.50	4.00
Mon.	27	7.50 NM	4.00
Tue.	28	7.50	4.00
Wed.	29	7.50	4.00
Thu.	30	7.50	4 00
Fri.	31	7.50	4.00

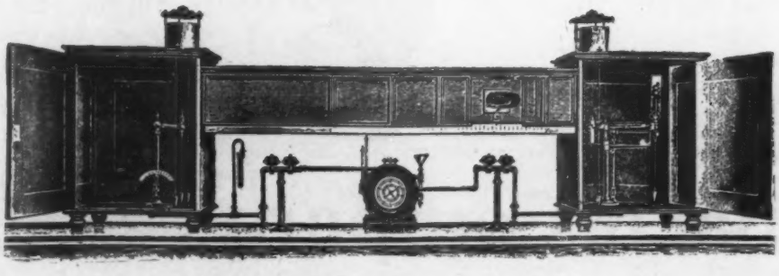
TOTAL HOURS DURING 1908.

By Table No. 1.

	Hrs.Min.
January	228.30
February	187.30
March	192.00
April	160.10
May	155.10
June	138.00
July	155.50
August	173.40
September	185.20
October	214.00
November	218.10
December	226.40
Total, yr.	2235.00







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

JULY, 1908.

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Complete Lighting in One Hour From Time Given P. M.	Complete Extinguishing in 50 Minutes From Time Given A.M.
Wed.	1	7.27	3.07
Thu.	2	7.22	3.07
Fri.	3	7.22	3.07
Sat.	4	7.22	3.07
Sun.	5	7.22	3.07
Mon.	6	7.22	3.07
Tue.	7	7.22	3.07
Wed.	8	7.22	3.07
Thu.	9	7.17	3.12
Fri.	10	7.17	3.12
Sat.	11	7.17	3.12
Sun.	12	7.17	3.12
Mon.	13	7.17	3.12
Tue.	14	7.17	3.12
Wed.	15	7.17	3.12
Thu.	16	7.12	3.17
Fri.	17	7.12	3.17
Sat.	18	7.12	3.17
Sun.	19	7.12	3.17
Mon.	20	7.12	3.17
Tue.	21	7.12	3.17
Wed.	22	7.12	3.17
Thu.	23	7.07	3.22
Fri.	24	7.07	3.22
Sat.	25	7.07	3.22
Sun.	26	7.07	3 22
Mon.	27	7.07	3.22
Tue.	28	7.07	3.22
Wed.	29	7.07	3.22
Thu.	30	7.02	3.27
Fri.	31	7.02	3.27

TOTAL HOURS DURING 1908.

	Hrs.Min.
January	481.50
February	329.15
March	351.50
April	341.50
May	233.05
June	218.10
July	282.55
August	254.55
September	292.25
October	420.45
November	374.30
December	411.05
	3992.35
Deduct on account of 50 min. extinguishing time	30.30
Total, yr.	3962.05

NEW YORK, 318 West 42d Street.
BOSTON, 820 Beacon Building.
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WELSBACH STREET LIGHTING COMPANY

....OF AMERICA....

No. 36.

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

The Chic Light.

ONE OF THE MOST POPULAR AND BEST SELLERS OF THE WELSBACH LINE.

For decorative appearance and large volume of light at a popular price to the consumer,

THE CHIC LIGHT

is practically alone in the field. Complete satisfaction to the user is its strong point.

THE CHIC LIGHT—Design No. 71310.

PRICES:

Boxed complete, with No. 71 Welsbach burner, No 310 F. Q. M. cylinder, No. 196 Junior J Brand Welsbach mantle, including the No. 316 opal shade, which will be packed separately.

Price, complete, clear cylinder, each, dozen lots, ... $1.35
Price, complete, clear cylinder, 100 lots, each, ... 1.25

When supplied with **No. 310 F. Q. M. Opal Cylinder** add 10 cents to above list.

Price of Shade No. 316.
Package Contains 16 Dozen.

Price, per dozen, ... $4.40
Price, original package, per dozen, . 4.00

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Salesrooms in all Leading Cities of the United States.

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Largest Builders of CARBURETTED WATER GAS PLANT IN AMERICA.

SOLE AMERICAN BUILDERS

OF THE

Standard Double-Superheater Lowe Water Gas Apparatus.

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Helena, Mont.
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Suffolk, Va.
Winsted, Conn. (2d contract).
Nashua, N. H.
Augusta, Me. (2d contract).
Everett, Mass.
Jenkintown, Pa. (2d contract).
Coney Island, N. Y.
Mexico, Mo.
Jacksonville, Fla.
Syracuse, N. Y. (2d contract).
Atlanta, Ga. (2d contract).
Holyoke, Mass.
Peoria, Ills.
Schenectady, N. Y. (2d contract).
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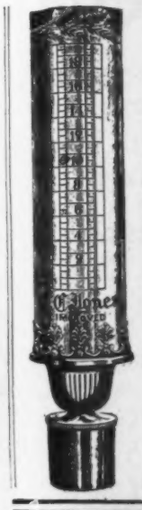

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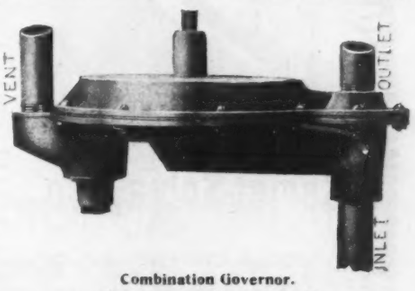

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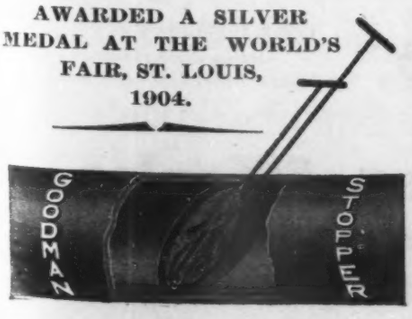

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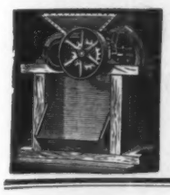

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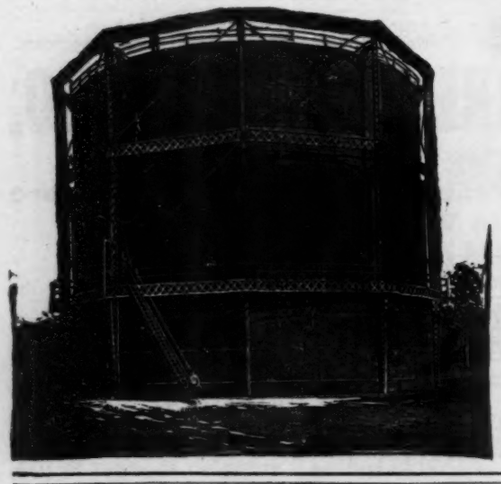

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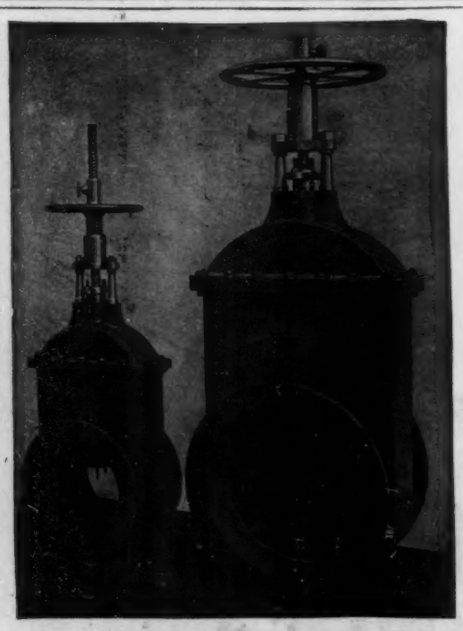

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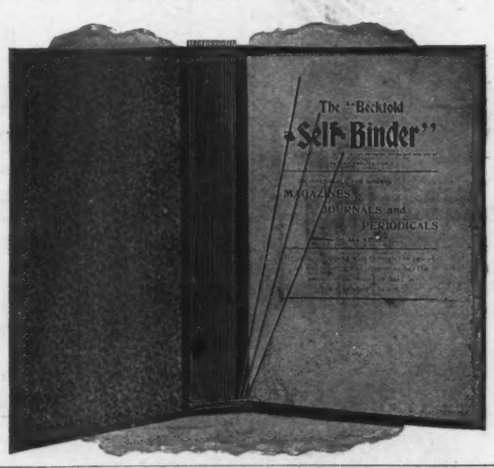

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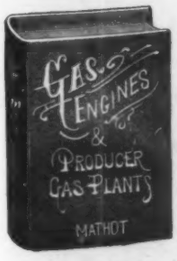

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